GEORGIA INSTITUTE OF TECHNOLOGY
ENGINEERING EXPERIMENT STATION

PROJECT INITIATION

Date: September 9, 1975

Project Title: Substate Energy Management

Project No.: A-1756

Project Director: Mr. R. E. Collier

Sponsor: State Energy Office; Atlanta, GA

Agreement Period: From 6/27/75 Until 12/26/75 (Performance Period)

Type Agreement: Standard Research Project Agreement dated 6/27/75

Amount: $50,000

Reports Required: Monthly Progress Reports; Final Report

Sponsor Contact Person:

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Deputy Director
State Energy Office, Room 148
7 Hunter Street
Atlanta, Georgia 30334

Phone: 656-5176

Assigned to: Industrial Development Division

COPIES TO:

Project Director
Director, EES
Assistant Director
Division Chief
EES Accounting
Patent Coordinator
EES Supply Services
Security—Reports—Property Office
General Office Services
Library, Technical Reports Section
Office of Computing Services
Project File
Other Sue Corbin; Bonnee Wettlaufer

RA-3 (8-75)

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: April 1, 1976

Project Title: Substate Energy Management

Project No: A-1756

Project Director: R. E. Collier

Sponsor: State Energy Office

Effective Termination Date: 2/15/76 (Contract Expiration)

Clearance of Accounting Charges: 2/29/76

Grant/Contract Closeout Actions Remaining: Copy of Final Report transmittal letter to OCA File

- X Final Invoice ~~and Closing Document~~ (including two subcontracts) as soon as all allowable charges clear).
- _ Final Fiscal Report
- _ Final Report of Inventions
- _ Govt. Property Inventory & Related Certificate
- _ Classified Material Certificate
- _ Other _____

Assigned to: Economic Development (~~School~~/Laboratory)

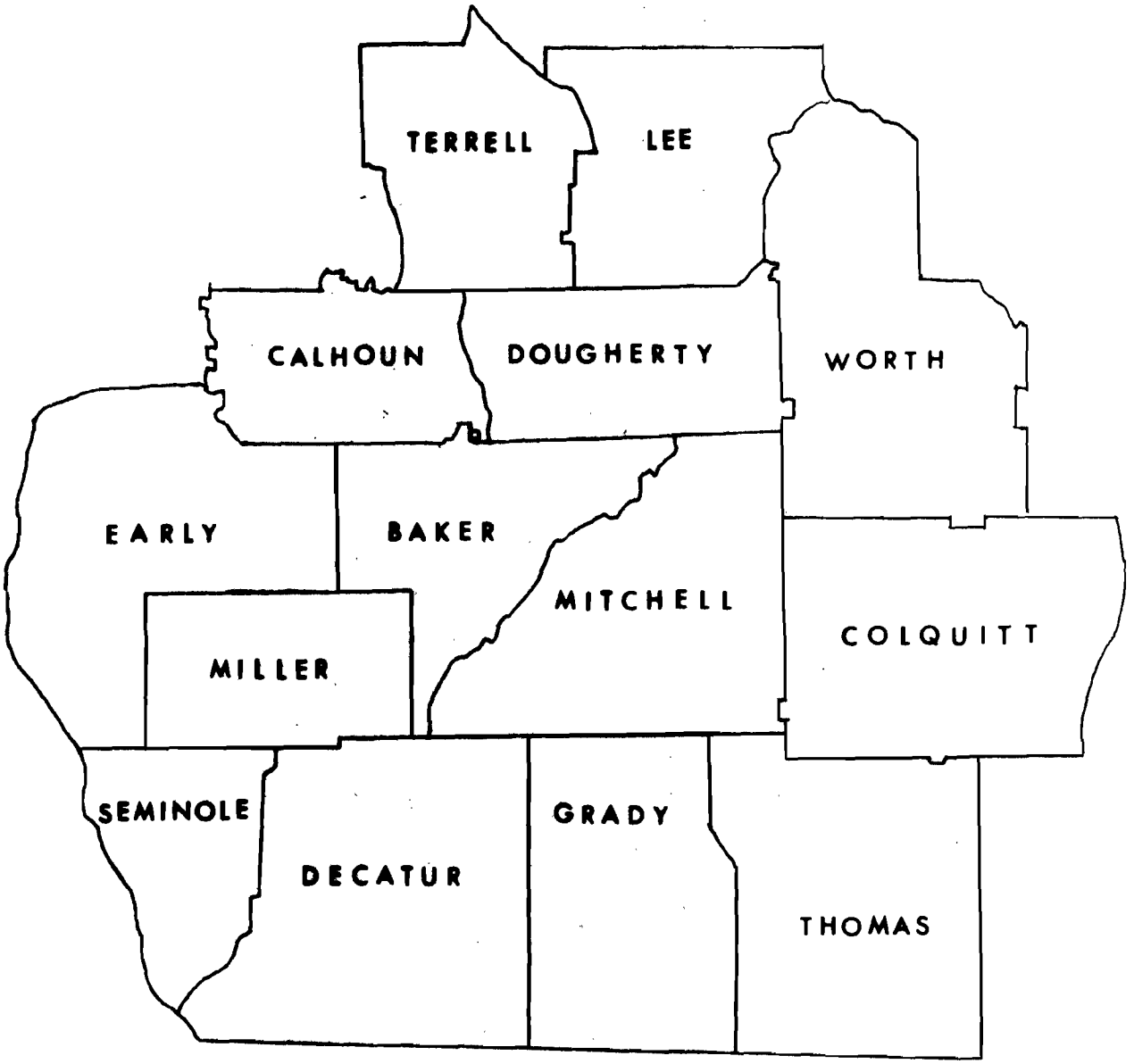
COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director—EES
Accounting Office
Procurement Office
Security Coordinator (OCA) ✓
Reports Coordinator (OCA)
Library, Technical Reports Section
Office of Computing Services
Director, Physical Plant
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

CA—4 (3/76)

Appendix A

ENERGY MANAGEMENT AND CONSERVATION IN THE 14-COUNTY SOUTHWEST GEORGIA APDC



RESEARCH DEPARTMENT

SOUTHWEST GEORGIA PLANNING AND DEVELOPMENT COMMISSION
CAMILLA, GEORGIA

JANUARY, 1976

ENERGY MANAGEMENT AND CONSERVATION IN THE 14-COUNTY SOUTHWEST GEORGIA APDC

BY

WAYNE WILLIAMS
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PARTICIA COLE

RESEARCH DEPARTMENT

SOUTHWEST GEORGIA PLANNING AND DEVELOPMENT COMMISSION

CAMILLA, GEORGIA

JANUARY, 1976

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SUMMARY

This report and the project activites associated with this report represent an initial effort to establish a substate energy management and conservation program for the 14-county Southwest Georgia APDC.

The objectives of the total project were to:

1. Role Players - Make a preliminary evaluation to ascertain if, and to what degree, and in what areas, the APDC might play a role in the energy management and conservation process and to identify other possible role players who could effectively contribute to the process.
2. Communications - Establish a more effective and continuing line of communication (regarding energy) between the State Energy Office and the substate area. It was felt that a communication network was needed from the local level to the state on up to the Federal Energy Administration. It was also felt that this network could work in reverse in terms of FEA communicating down to the substate basis.
3. Develop - A higher level of interest in energy management and conservation in the substate area and motivate the appropriate role players to initiate and maintain a high level of interest in same.
4. Problem Identity - To identify and quantify, to the extent possible, the energy related problems in the substate area as viewed or perceived at the local level.
5. Program Design - To provide the rudiments of a program design (as viewed from the substate area) which would improve energy management in the area based on solving the problems identified, by the role players identified, within the communication network established, made possible by higher levels of interest in the process on the part of the role players.

While, these objectives could be divided into many sub-objectives, the above

five adequately summarize the scope of this project.

This summary will address each of the above five major objectives.

Role Players

The text of the report addresses each of the following four types of energy sources - Electrical; Natural Gas; Gasoline, Diesel and Fuel Oils collectively; and L. P. Gas. (Other energy sources were not deemed relevant for a rural substate plan).

The potential role of the APDC varies according to energy source. The potential role of other substate entities also varies by energy source.

While the ultimate consumer must be considered in the total process, he is definitely not the role player that will provide any significant improvements in energy management or conservation, since this depends on voluntary efforts. Obviously, indoctrination of the very young will yield long-run results; but the present consumers will respond only to price or mandatory policy.

Obviously, this leaves government and/or suppliers as the ultimate effective role players. And this can be local, state or federal depending on the situation.

Within the substate area there are ten municipalities which retail electricity to customers. The combined population of these ten municipalities is 134,425 or approximately 45 percent of the total population of the area. Thus, the ultimate authoritative role players are the city managers or city fathers of these ten towns.

The remaining electricity in the substate area is provided by Georgia Power Company and the Electric Membership Cooperatives. They are potential role players in the process; but, traditionally, they have depended primarily on their own management resources, etc.

In short, the APDC has established a liaison with most of these towns regarding electrical energy management. Consequently, the role of the APDC is one of a

catalyst as well as a channel through which information, problems and technical assistance can flow.

Natural gas also falls in the same retail category as electricity. Sixteen municipalities serve 183,524 people or 61 percent of the entire substate population. Again, these are the ultimate authoritative role players. The APDC, again, can function as the catalyst, information channel and some technical assistance.

The potential APDC role is not as large in the area of gasoline, diesel, fuel oils and L.P. gas fields. By the same token, the local government role is not as large in these fields. This, obviously, is due to the fact that these fuels are marketed exclusively through the private sector. The state can best function as the authoritative role player in the process. This, however, does not mean that the APDC and/or local governments do not have some desirable roles.

There are areas such as education, data dissemination, technical assistance on fleet management, unique needs and circumstances, etc. in which the APDC can relate to the state and also relate to the local leaders.

Communications

The preceding summary regarding role players has already implied the significance of the communication network.

As has already been stated, the APDC has a liason with most of the local governments regarding energy. It is important that this relationship be maintained and that the lines of communication remain open.

This report has enumerated a host of problems regarding energy. Many of these are realistic management problems for which there are answers, while some are problems for which there are no satisfactory answers.

The point is this. The lines of communication have been opened. These governments need answers, knowledge, advice and technical assistance. They cannot make policy changes without benefit of the assistance. If this assistance comes, the lines of communication will remain open.

Develop Local Interest in Management and Conservation

As stated in the above section relating to communication, some interest has been developed as a result of the project; and, obviously, some existed prior to this project for various reasons. One of the prime "interest developers" or motivation has been tight municipal budgets in the case of local governments. In most cases, because of lack of knowledge and the inability to cope with energy management related savings, other budget cuts are made on such items as salaries, capital expenditures, etc.

Electrical or natural gas rate increases are simply passed on to the customer rather than attempting to find methods by which energy management practices could be implemented. Also, while there is interest, some are doubtful that anything constructive can be accomplished short of improving the situation on a national basis. In short, they are more or less resigned to their fate.

Again, however, the interest level is somewhat higher than in the past; the communication lines are open and the problems have been presented. It will take the full cooperation of state and federal officials responding to these problems, working together with "grass roots" energy planners to maintain this and increase this level of interest.

Problem Identity

One of the primary purposes of this project was to identify specific energy-related problems in the substate area. The following problems have been extracted from the detailed report. Some relate to data problems which are essential to analyzing and monitoring energy flows in the substate area, while others address more direct energy-related problems. These problems are listed by types of energy sources. However, before going into a listing of these specific problems, it is appropriate to mention a broad general problem as viewed by the APDC in terms of energy management and planning.

"For a number of years, Federal agencies such as HUD, EDA and others have recognized the need for area or substate planning and have provided funding for conventional planning. Funds are provided for local and areawide planning for recreation, sewer and water, zoning, land use, flood control and a host of others. EDA's prime concern is job creation.

Yet, no funds are apparently available for energy planning or technical assistance. Energy touches every aspect of the economy. It is basic to jobs and income. Why have land use planning or recreational planning if there is not sufficient energy (due to lack of planning) for creating and maintaining jobs?

The APDC views this lack of funds for a full-time energy planner on the staff as one of the major problems.

In addition, some Federal Agency should be spending more funds on basic and applied technical research to better utilize our energy sources and to expedite development of new sources".

ELECTRICAL ENERGY PROBLEMS

1. Problem: Boundary discrepancies (EMC) for KWH.

   Total energy consumption (KWH) is needed (by end use-residential, commercial, etc.) on an annual basis (historically, currently and projected) for the APDC area. This type information is available by EMC, but EMC boundaries are not compatible with the APDC area. Adjusted data is needed on EMC's in order that it can be aggregated with Georgia Power Suppliers and municipal suppliers to come up with total KWH consumed which can be related to economic indicators such as employment, population, etc. and also, to provide a mechanism for continued monitoring of consumption. This data is already readily available on ten municipalities which retail electricity.

2. Problem: Boundary discrepancies (Georgia Power Company) for KWH.

   Problem is the same as number one above.

3. Problem: Data relating to peak loads or KWH.

   Information is not readily available regarding peak loads by substations, etc. for Georgia Power Company and the EMC's. Unlike energy (KWH), peak demand has to be analyzed on the basis of individual municipalites, substations, or individual direct customers in order to properly assess and address the problem. The objective would be to obtain information regarding peaks for Georgia Power Company and EMC's within the substate area. (Peak information is already available on municipalities).

4. Problem: Lack of knowledge or delineation of factors contributing to reduced KWH (Energy) consumption in 1974. Was it economy related, weather, patriotic, price response? How much did each contribute?

   If this consumer response information were obtained, it could provide important keys or "direction" in determining appropriate policies and pricing with regard to conservation and management programs.

5. Problem: Lack of knowledge relating to basic correlation between energy consumption changes and peak demand changes during same period.

With regard to electricity, everyone agrees that peaks rather than energy consumption is the major problem. Energy consumption is easier to manipulate; and, through this, peaks could be better controlled if the above relationship was known, resulting in better management and reduced cost to consumer.

6. Problem: Lack of knowledge relating to demand elasticity in terms of KWH and KW. (This has already been implied in other problems but is spelled out specifically again).

Elasticity varies considerably as the price ranges change. Very little is known on this subject, since energy has been relatively cheap in past years. Basic demand elasticity is essential in setting a price structure that tends to conserve energy and/or reduce or manage peak loads.

7. Problem: Lack of detailed weather patterns correlated to energy (KWH) and peak demand (KW). Raw data regarding weather is available but correlation is not known. (This problem was mentioned earlier as part of a larger problem but deserves major attention as project in itself).

This information would be helpful in developing a mechanism or model that can adequately predict the consumption and demand given alternate weather conditions.

8. Problem: Lack of knowledge on the part of users or consumers with regard to the peaking problem.

Consumers have been bombarded with leaflets, tips and information regarding conservation of energy (KWH). Yet, very few consumers are aware of the peaking problem; and, certainly, even fewer know how to address the problem. There is a need to educate consumers or users on the peaking problem, and methods of helping to alleviate it probably in conjunction with time-of-day pricing or simply high summer rates.

9. Problem: Failure of energy planners to recognize and face the reality that consumers will not cut back significantly strictly out of patriotism. (Millions of dollars have been expended on conservation based on the premise that the consumer is patriotic - to no avail).

In many cases, the alternate approach involves legislation or policy that must be initiated by local, state, or federal authorities; and such action may prove politically unpopular. Also, there are some aspects of pricing that may be effective but have not yet been proven. (Energy planners tend to opt for the non-controversial solutions).

10. Problem: Lack of knowledge on the part of many suppliers (particularly some of the municipal suppliers) regarding possible methods of managing electrical systems in terms of peaks, etc.

How can suppliers educate their customers if they are not fully knowledgeable of the problem?

11. Problem: Lack of concern on the part of many suppliers (particularly some of the municipal suppliers) regarding the adoption of energy conservation and management practices.

Suppliers, particularly some of the municipalities, are more concerned with the traditional routine of operating government. Some simply do not think in terms of innovative practices.

12. Problem: Cost of energy.

(This is obvious, but should be included as a matter of record). Not only is it creating severe hardships particularly on lower income families, it is diverting more personal income away from the purchase of other goods, particularly durable goods as opposed to nondurable and, thus, impacting detrimentally on the economy.

13. Problem: Lack of research on technical energy saving devices for home and business appliances.

If such devices are generally available, they are not readily available in the substate area.

14. Problem: Many customers of the electrical power suppliers do not have demand meters.

These modifications are costly; and, if used in conjunction with pricing and education programs, they might prove to be economical. Data are needed on investment versus possible savings.

15. Problem: Lack of "profile" of electrical customers by municipalities.

In order to effectively reduce peaks, a detailed customer analysis must be made in each municipality. For example, schools may contribute heavily to a peak; and the solution may be to delay school opening for a couple of weeks.

16. Problem: In many towns, effective rate structures are much lower in the summer than in the winter.

Even if towns have the same rate all year, many have graduated rates which are lower for larger volumes. This results in lower effective rates for the summer. This should be corrected even before major efforts are made to develop optimum rate structues. Consequently, existing rate analyses are needed on all the municipal suppliers.

NATURAL GAS PROBLEMS

1. Problem: Lack of natural gas consumption data.

Considerable data regarding natural gas consumption was collected during the course of this project. However, data continues to be a problem in the following areas:

A. Historical data pertaining to daily allotments for the sixteen municipalities retailing natural gas and six direct customers.

B. More complete historical data and analyses relating to total consumption of natural gas for the past several years (10, if possible). (Must go back to pre-crisis days if data are to be useful).

C. Need additional current and historical data on natural gas consumption by end use (residential, commercial, industrial, etc.).

This information is needed to successfully relate natural gas consumption to various economic indicators and to establish a continuing monitoring process.

2. Problem: Lack of peak consumption information on natural gas.

Considerable data regarding peaking of natural gas was collected during the course of this project. (Aside from the obvious shortage problems, peaking of natural gas consumption is considered to be one of the major problems). This information was not readily available on some municipalities and, also, was not readily available on a historical basis in any of the towns.

Like electrical peaks, natural gas peaks must be analyzed and addressed on a specific location basis; so it is vital that information be obtained on each municipality.

Furthermore, much of the data presented in the report represents averages. Daily consumption of natural gas by each municipality is a must if the problem of peaking is to be addressed and, at least, partially alleviated.

3. Problem: Direct problems relating to peaks.

As stated previously, some information (although insufficient amounts) was collected regarding peaking. However, a sufficient amount of information was collected to identify the following general problems.

A. Many towns are not using their full natural gas allotments when viewed on an annual consumption basis. (Some only use as little as ¼). This means that much of this valuable resource is reverting to areas outside the substate area and represents a real minus for the area in terms of economic activity.

B. Municipalities (as suppliers) are losing revenue when this gas reverts to other areas, which means that per unit cost of the volume which they do sell is much higher. This cost is passed on to the consumers.

C. Many towns which are using only ¼ of their natural gas allotments have had, for some time, a flat policy of no new industrial customers, even though, in some cases, they could have provided natural gas to a new customer every day during the year except six or seven days curtailment. These towns should have a selective approach and solicit new industries that can and/or are willing to close down for a few peak days; and/or industries that can use alternate fuels in the winter. Many are refusing customers out of ignorance or either are not aware that there are industries which can and would be willing to accept some winter curtailment.

4. Problem: Lack of peak shavings plants in some municipalities.

Data on economics or feasibility of same is needed. Also, data on economics or feasibility of joint peak shavings plant for two or more towns is needed.

5. Problem: Rate structures for natural gas in individual towns should be analyzed in some detail similar to that of electricity.

In many cases, rate structures are rather arbitrary without regard to energy

management, conservation or the public's well being. The sixteen municipalities are free to manipulate rates as they see fit. The only restriction is political acceptability.

6. Problem: As was the case for electricity, a customer profile of natural gas users must be accomplished by towns.

Only in this way, can appropriate steps be taken to manage peaks, conserve energy; and others use this resource efficiently.

7. Problem: Lack of knowledge on the part of municipal suppliers regarding natural gas management.

Many municipalities simply are not knowledgeable with regard to management. Some municipalities hire consultants, and in many cases, the consultants are more concerned with routine than any inovative practices.

8. Problem: Lack of concern on the part of municipal suppliers regarding natural gas management.

This is simply a problem of apathy or involvement in the routine.

9. Problem: Analysis of unique users.

Some information was collected on unique natural gas users in the substate area including crop drying and nitrogeneous fertilizer. This should be analyzed in more detail particularly that of crop drying.

10. Problem: Failure of energy planners to recognize and face the reality that consumers will not cut back significantly strictly out of patriotism. (millions of dollars have been expended on conservation based on the premise that the consumer is patriotic - to no avail.

In many cases, the alternate approach involves legislation or policy that must be initiated by local, state, or federal authorities; and such action may prove politically unpopular. Also, there are some aspects of pricing that may be effective but have not yet been proven. (Energy planners tend to opt for the non-controversial solutions).

11. Problem: In many towns, effective rate structures are much lower in the summer than in the winter.

Even if towns have the same rate all year, many have graduated rates which are lower for larger volumes. This results in lower effective rates for the summer. This should be corrected even before major efforts are made to delete optimum rate structures. Consequently, existing rate analyses are needed on all the municipal suppliers.

12. Problem: Policies (on the part of pipelines) with regard to natural gas suppliers are not clear in terms of what a municipal supplier can or cannot do.

This makes it very difficult if not impossible for outside agencies involved in industrial promotion (such as railroad companies, Georgia Department of Industry and Trade, etc.) to plan for the development of a town or even to discuss natural gas availability with a prospect.

13. Problem: Somewhat related to the need for a customer profile in each town as the problem of identifying those industrial users that could convert either 100% or on an alternate basis to fuel oils, etc.

Data on the economic feasibility of such possible conversion are needed. This may be users in the private sector, or it might be larger governmental or institutional users.

GASOLINE AND DIESELS INCLUDING FUEL OILS PROBLEMS

1. Problem: Great distrust and frustration with major oil companies and the Federal Government on the part of the general public and many informed local leaders.

   This problem is much more evident with motor fuels than with utility fuels probably because of more frequent exposure to high prices.

2. Problem: Fear of company take-over of stations.

   Many independent and franchised dealers as well as the gasoline retailers association fear company take-over of stations. This fear is not shared by all. Some feel that more company-operated stations would be desirable.

3. Problem: It is difficult to deal with conservation and management of gasoline when a surplus exists.

   Obviously, this supply situation could change with another embargo; but local people in the substate area are more or less apathetic to this. As stated earlier, the problem is viewed as outlined in number one, above.

4. Problem: There are definite data problems associated with gasoline, diesel and fuel oils.

   Even accurate total consumption of these fuels is difficult but can probably be derived fairly easily with some additional work. However, end-use consumption or consumption by sector is a very difficult problem. Needless to say, this information is needed in order to project needs and to correlate with various economic indicators.

5. Problem: With few exceptions, fleet management in the government sector does not offer a great potential.

   Many of the governments are small and savings would be proportionately small.

6. Problem: Local people (consumers) dislike the idea of government control, rationing allocations, etc. in crisis situations.

   Yet, there does not appear to be any concrete alternative that can be applied at the local level, except developing and maintaining a workable data system which can be used to monitor the supply/demand situation.

L. P. GAS PROBLEMS

1. Problem: Data deficiencies.

   Aside from the shortage, one of the major problems relating to L.P. gas is data. While consumption can be obtained at the state level, substate data relating to demand and supply is not readily available.

2. Problem: Transportation and Storage.

In terms of functional problems, task force members felt (aside from the shortage aspects) that the main problems were lack of adequate transportation and storage; and some of the suppliers felt that natural gas should be completely decontrolled.

PROGRAM DESIGN

The Industrial Development Division of the Georgia Institute of Technology is currently designing a program which can be used to quantify energy flows for the state and substate areas. This model will be developed in such a manner that it can be used to continuously monitor these energy flows in the future as well as relating these flows to various economic indicators.

The substate plan recognizes a need for this type of model. Many of the problems pointed out in the report relate to this aspect of energy management. In fact, this report addresses these same aspects in a very rudimentary manner but, obviously, (because of lack of manpower, funds and computer technology) could not address the problem completely.

In short, the substate plan assumes that a model, as described above, is basic to a management plan. However, the substate plan does provide or suggest methods of analysis which goes beyond the development of such a model.

The IDD model, at best, will be general in nature and as such does not address some of the local problems such as peaking or seasonal consumption in natural gas and electricity. It would not address the problem of "customer profile" on an individual municipality basis. It does not address the possibility of rate structure or "facilitative legislation". (Other examples could be cited).

Consequently, the substate plan suggest methods by which this can be accomplished. To summarize these methods, it should suffice to say that it would involve a detailed analysis of customers, rates, detailed consumption patterns, including daily and even hourly consumption and, analysis of present policies and consideration

of new policies by towns (as applied to electricity and natural gas). In addition, some external basic data regarding price elasticity is needed.

In terms of fuels such as gasoline, diesel and other fuel oils and L.P. gas, it is felt that the IDD model, when completed, would be adequate.

INTRODUCTION AND GENERAL OBJECTIVES

In August, 1975, the Southwest Georgia APDC contracted with the Georgia Institute of Technology to prepare a program design for a substate energy management and conservation plan. The Southwest Georgia APDC was one of two Area Planning and Development Commissions in the state which participated in this program. The other APDC participating was the Atlanta Regional Commission. The Southwest Georgia area is basically a rural area, and the Atlanta Regional Commission area is obviously urban. The choice of these two very different substate areas was deliberate.

It was felt that the energy needs, problems and possible management and conservation approaches would be quite different in the two locations and, thus, could provide state energy planners with input and ideas relative to handling energy related matters in distinctly different environments.

It is appropriate to digress for a moment to indicate the role of the State in this project. During the brunt of the energy crisis, the State Energy Office primarily reacted to problems. That office worked closely with the Federal Energy Administration in allocation of supplies and related areas. When the problem eased after the lifting of the embargo, the State Energy Office felt that additional energy management and conservation planning was needed in order that their office would be better prepared in the event of another crisis.

As a result, one of the planning efforts undertaken was to enter into an agreement or contract with the Georgia Institute of Technology to provide a systematic method for handling energy planning. The Georgia Institute of Technology as well as the State Energy Office and the Federal Energy Administration felt that local or substate input to this plan was essential to the development of a state plan. Hence, the Southwest Georgia APDC became involved.

As already implied, it was felt that energy problems, energy uses, etc., as well as energy management and conservation potentials might well be vastly different in different areas of the state such as the rural southwest Georgia area as compared with metropolitan Atlanta. Consequently, any state plan, it was felt, should take these possible differences into consideration.

Furthermore, the abrupt manner in which the energy crisis occurred and the circumstances surrounding the crisis as well as subsequent events have been most confusing to the general public. It was felt that a substate plan or design should be more than a plan. That is, the process of developing the plan should and would be used to identify and interest local people in the need for a continuing management and conservation program. In short, the program is a process as much as a plan. Again, it was felt that the APDC, by virtue of its contacts at the local or "grass roots" level, could stimulate a continuing interest in the energy management and conservation process.

This report, then, attempts to identify some of the trends in energy consumption in the substate area, to isolate some of the unique needs and problems of the area, to identify some of the people or entities in terms of role players in the energy management process and to present some of the ideas on the problems and potentials as viewed by local people. In terms of a program design, it attempts to outline methods by which the impact of various situations and alternatives can be measured. It makes suggestions and recommendations regarding possible alternative approaches to energy management and conservation.

It should be emphasized that this project was basically one of providing a program design rather than a compendium of statistics and economic analysis. However, it became necessary to obtain considerable quantities of data as a means of identifying and quantifying problems. Some of this data was also used to illustrate examples of what should be accomplished in the implementation of the pro-

gram design.

Consequently, the end result is not a pure and abstract program design. It is a mixture of a program design, economic analysis and problem identity. It leaves many unanswered questions and certainly points out the need for additional research and continued effort into various aspects of energy management at the local level.

It is hoped that this effort and this report will be helpful to state and federal energy planners as they attempt to set state and national energy policy and as they attempt to set priorities in terms of needed research as well as interest, motivate and assist local people and local entities in energy management regardless of state or federal activity.

DESCRIPTION OF SUBSTATE AREA

(Southwest Georgia Planning and Development Commission Area)

Map I details the substate area under consideration for this project. Map II pinpoints the substate area in relationship to its geographic position within the State of Georgia and the Southeastern States.

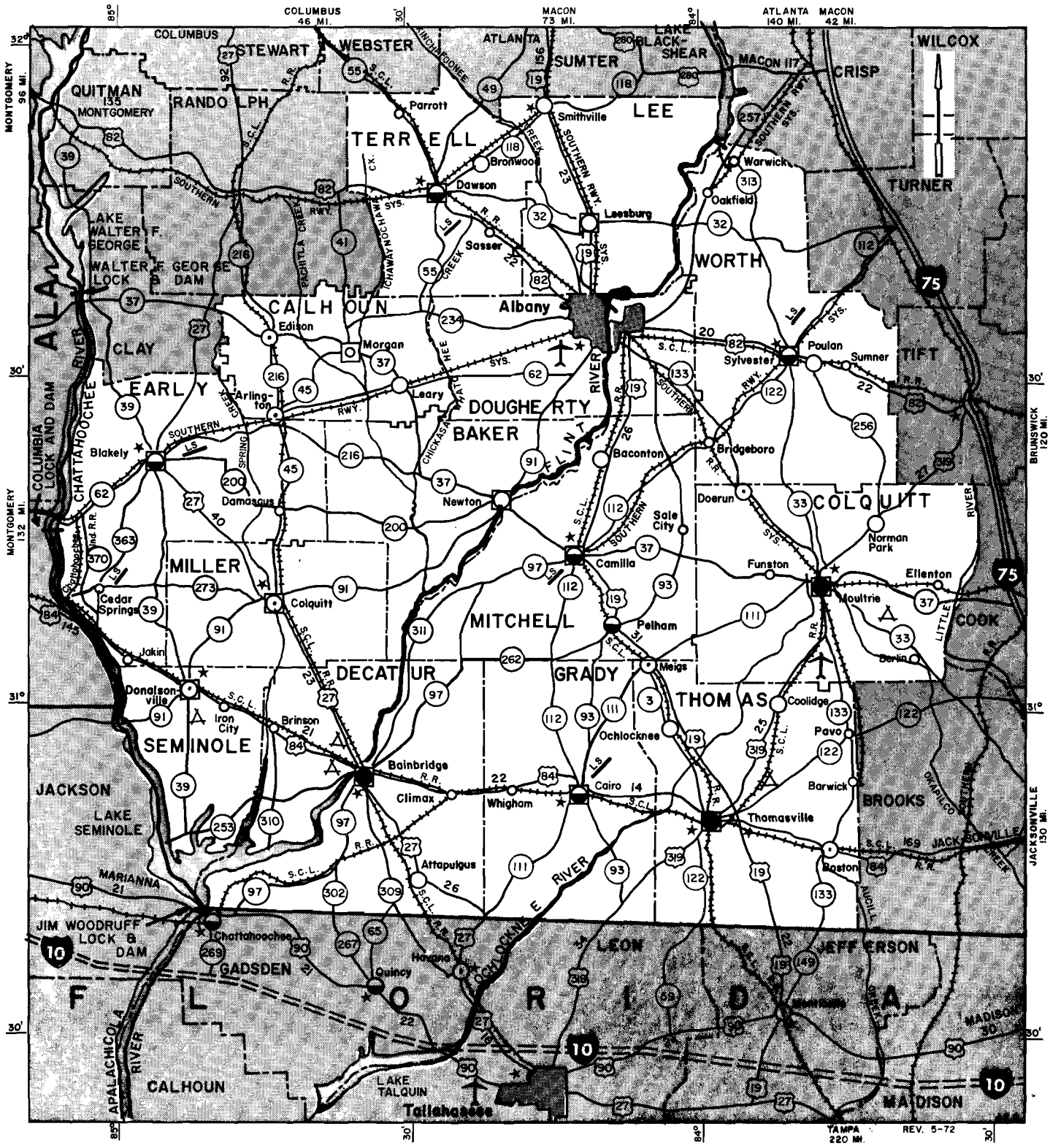
The area includes 14 counties in the extreme southwestern corner of the State of Georgia and encompasses some 5,966 square miles with a total population in 1974 of 300,000. Within this fourteen county area, there are 44 incorporated "places" or municipalities. Table I lists these 44 towns with 1970 population and 1974 population estimates. The population of these municipalities and places totaled 180,000 in 1974, leaving about 120,000 people residing outside the city limits.

In terms of an individual municipality basis, Albany is the largest with a 1974 population of 78,410, followed by Thomasville with 18,548, Moultrie with 14,177, Bainbridge with 9,934 and Cairo with 7,876. There are five other towns around the 5,000 range. By and large, the remaining towns are less than 1,000.

As the reader will note later, this population structure has implications in terms of "reaching" people for energy management purposes through local governments functioning as suppliers on some energy sources.

Map III provides the reader with some idea of the climate in the Southwest Georgia area. The climate is influenced by prevailing winds from the Gulf of Mexico. This accounts, in part, for the relatively small difference of 28.3^{o} between average July and January temperatures. As the map indicates, the area has an annual average of seasonal degree days of 1,529 and a frost-free period of 245 days.

The area is basically agriculturally oriented with the exception of Albany, the one SMSA. However, manufacturing is becoming increasingly important. Nine-



FOURTEEN COUNTY SOUTHWEST GEORGIA PLANNING & DEVELOPMENT COMMISSION AREA

Legend

- County seat
- Under 500
- 500 – 1000
- 1,000 – 5,000
- 5,000 – 10,000
- 10,000 – 25,000
- Over 25,000

- LS — PAVED LANDING STRIPS
- SCHEDULED COMMERCIAL FLIGHTS
- AIRFIELDS WITH PAVED RUNWAYS MINIMUM LENGTH 5,000 FEET... AVAILABLE INDUSTRIAL PROPERTY

10 0 10 20

SCALE IN MILES

- 84 — U. S. Highway Number
- ★ 45 ★ Mileage between starred Cities
- Interstate Highway
- 97 — State Highway
- RIVERS AND STREAMS
- NAVIGABLE WATERWAYS

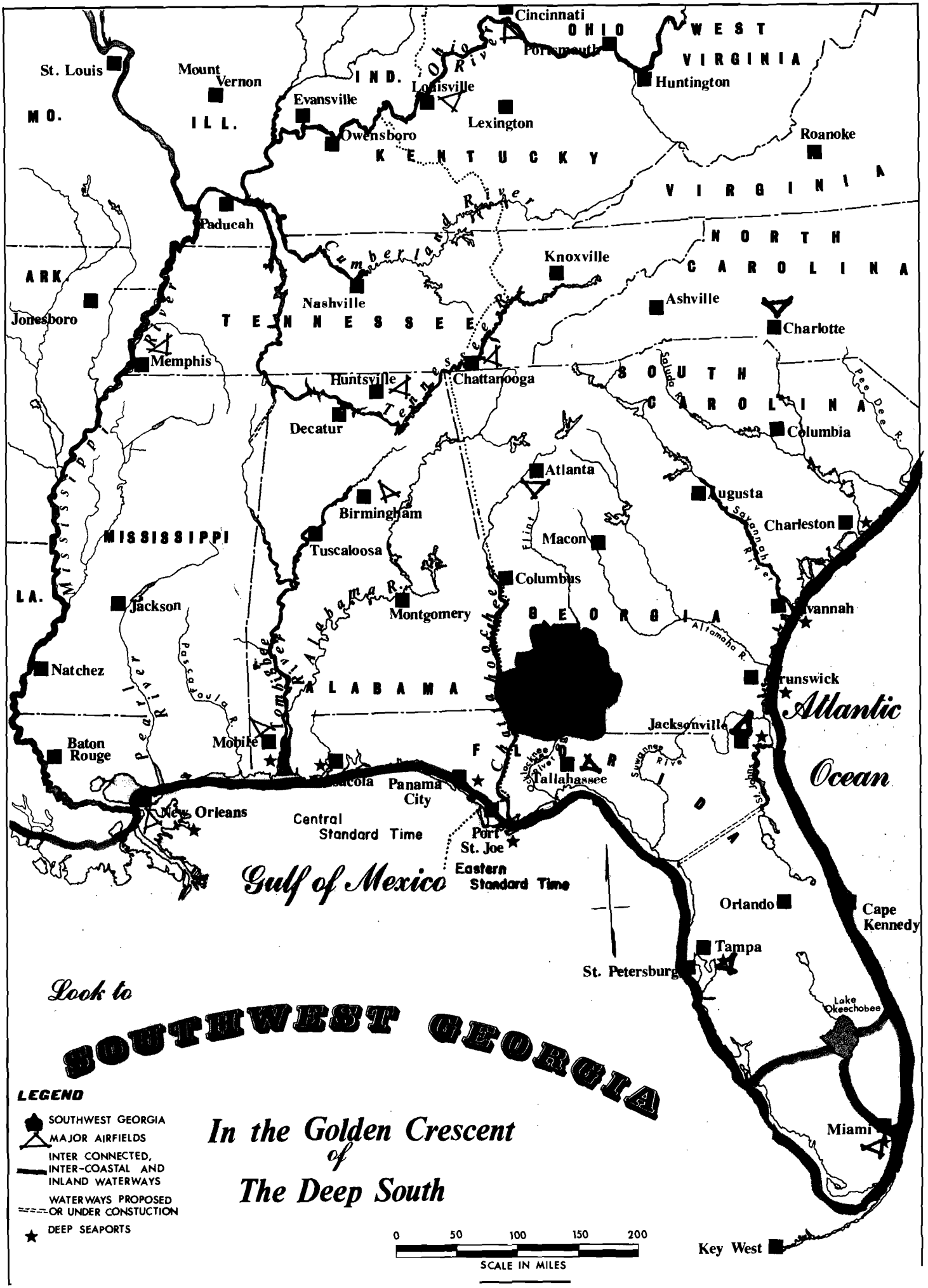

Look to
SOUTHWEST GEORGIA
In the Golden Crescent
of
The Deep South
LEGEND
SOUTHWEST GEORGIA
MAJOR AIRFIELDS
INTER CONNECTED, INTER-COASTAL AND INLAND WATERWAYS
WATERWAYS PROPOSED OR UNDER CONSTUCTION
DEEP SEAPORTS
0 50 100 150 200
SCALE IN MILES
Gulf of Mexico
Atlantic Ocean
Central Standard Time
Eastern Standard Time
Cincinnati
Portsmouth
Huntington
St. Louis
Mount Vernon
Evansville
Louisville
Lexington
Owensboro
Roanoke
Paducah
Knoxville
Nashville
Ashville
Charlotte
Jonesboro
Memphis
Huntsville
Chattanooga
Decatur
Columbia
Atlanta
Augusta
Birmingham
Charleston
Macon
Tuscaloosa
Columbus
Jackson
Montgomery
Savannah
Natchez
Brunswick
Baton Rouge
Mobile
Jacksonville
Panama City
Tallahassee
New Orleans
Port St. Joe
Orlando
Cape Kennedy
Tampa
St. Petersburg
Lake Okeechobee
Miami
Key West
OHIO
WEST VIRGINIA
VIRGINIA
KENTUCKY
NORTH CAROLINA
SOUTH CAROLINA
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
ARK.
MO.
ILL.
IND.
LA.

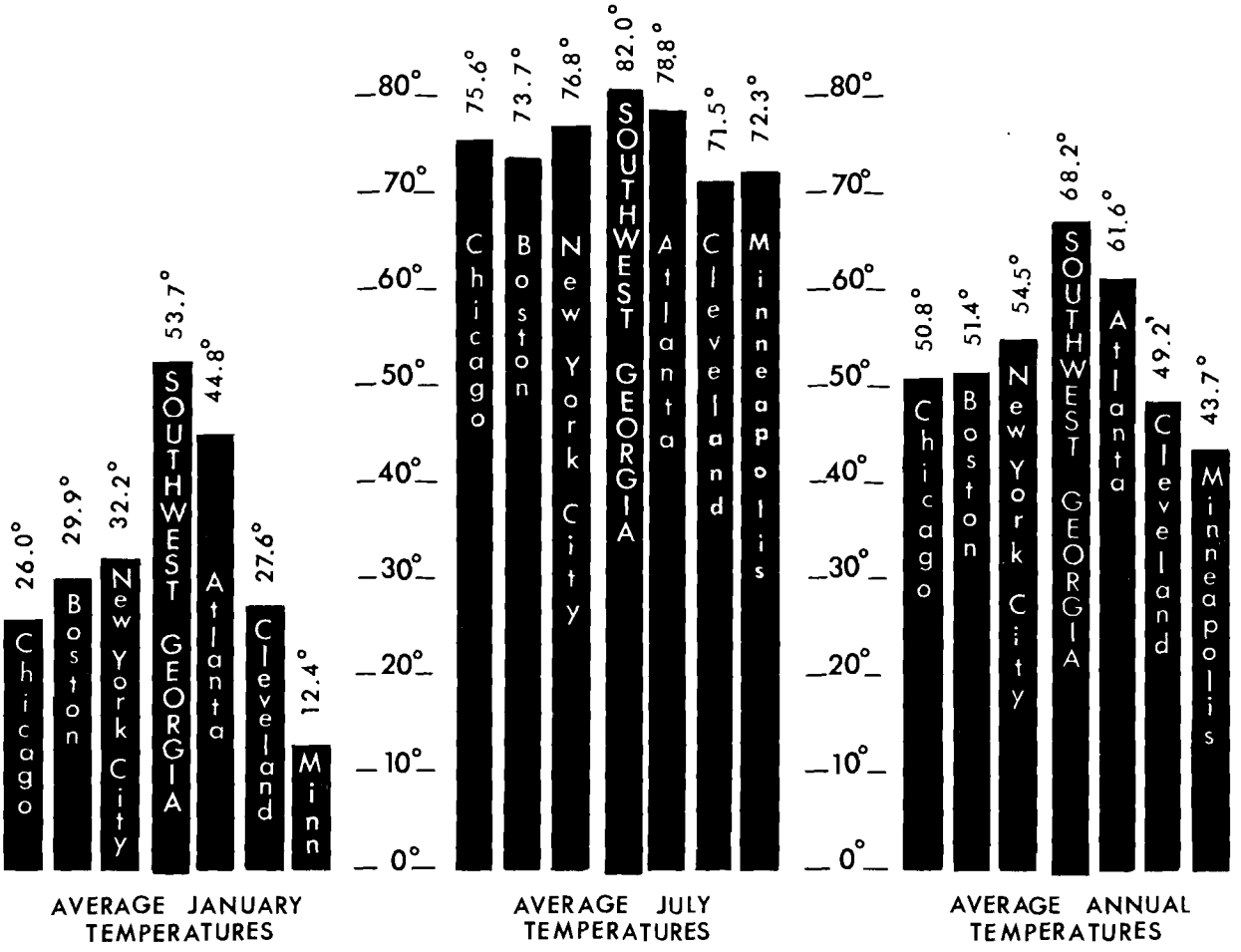
TABLE I.
1970 POPULATION AND 1974 ESTIMATES
FOR SOUTHWEST GEORGIA AREA

City	1970	1974
Albany	72,623	78,410
Arlington	1,698	1,774
Attapulgus	513	529
Baconton	710	730
Bainbridge	10,887	9,934
Barwick	381	470
Berlin	422	438
Blakely	5,267	5,455
Boston	1,443	1,616
Brinson	231	242
Bronwood	500	488
Cairo	8,061	7,876
Camilla	4,987	4,856
Climax	275	283
Colquitt	2,026	1,818
Coolidge	717	768
Damascus	272	281
Dawson	5,383	5,138
Doerun	1,157	1,093
Donalsonville	2,907	3,050
Edison	1,210	1,319
Ellenton	337	350
Funston	293	304
Iron City	351	384
Jakin	172	175
Leary	907	910
Leesburg	996	1,304
Meigs	1,226	1,123
Morgan	280	281
Moultrie	14,400	14,177
Newton	624	629
Norman Park	912	945
Ochlocknee	611	652
Parrott	222	218
Pavo	775	814
Pelham	4,539	4,254
Poulan	766	843
Riverside	114	119
Sale City	323	332
Sasser	339	330
Smithville	711	935
Sumner	207	228
Sylvester	4,226	5,027
Thomasville	18,155	18,548
Warwick	466	513
Whigham	381	386
Southwest Georgia Area Total	174,003	180,349

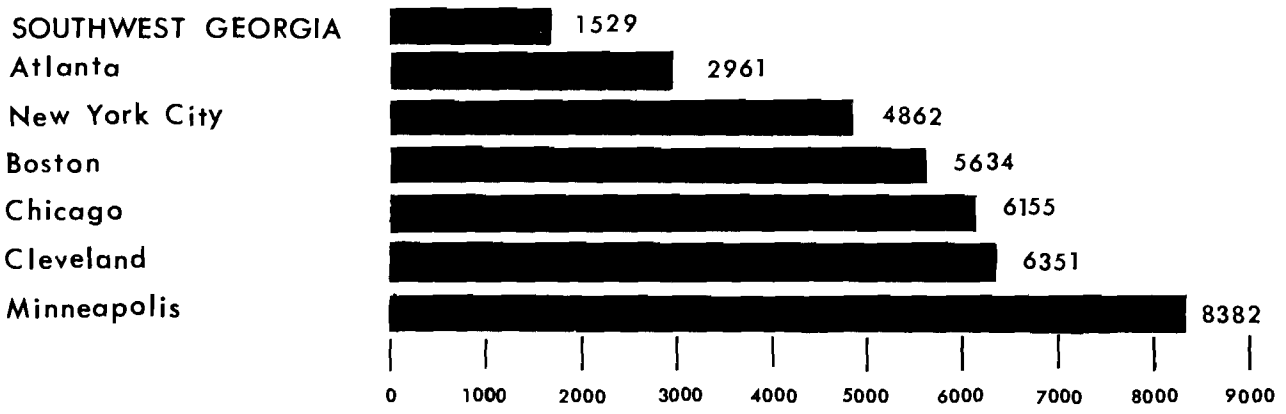
SOURCE: Office of Planning and Budget

SOUTHWEST GEORGIA CLIMATE

as compared to that of other selected areas



Average Seasonal Degree Days



teen of the 21 Standard Industrial Classifications are represented in the area. Approximately 540 manufacturing firms ranging in size from three or four to more than 1,700 employees are located in the area. Total manufacturing employment in 1974 was 319,797, or 11.2 percent of the area population of 285,295 (1970 Census).

PROCEDURES

SCOPE

One of the first elements in the work program was to determine the general scope of the project. Energy is obviously very complex, overlapping and interrelated by source, and impacts or relates to practically every aspect of the economy. Also, there are certain elements of the energy situation which appear to be beyond the scope of a substate plan. For example, basic technical research in solar energy or other possible "new" energy sources, while obviously needed, did not appear to be an appropriate subject at the rural substate level. By the same token, other basic technical research relating to energy saving scientific improvements in machinery and equipment, while obviously needed, was also felt to be beyond the realities of substate consideration.

In short, it was decided that the "scope" should be limited to the management and conservation of the commonly used energy sources, specifically electricity, natural gas, gasoline and diesel, other fuel oils, and L.P. Gas. Furthermore, in terms of objectives, it was decided that these energy sources should be viewed from two rather basic perspectives.

1. Management to include conservation on a substate basis.
2. Self interest of the substate area (unique needs, allocations, possible contribution to state and federal policy, etc.)

TASK FORCE ORGANIZATION

Having reached this tentative framework and recognizing that the APDC did not have the technical expertise, nor did it really know the views and ideas of the local people with regard to energy, it was decided that a comprehensive energy task force should be formed which could provide needed input to the project.

Staff members labored extensively in attempting to design a task force structure that would be the most effective and most representative of all segments of the community. It was finally decided that the best approach would be to

solicit membership on the basis of energy sources rather than economic sectors. Consequently, the task force was designed to obtain several members representing the following areas.

A. Electricity

1. Suppliers (wholesalers and retailers)
2. Heavy Industrial Users (manufacturing)
3. Merchants or Commercial
4. Individual Consumers (residential)
5. Special Groups (associations, minority, poor, etc.)
6. Public Administration

B. Natural Gas

1. Suppliers (wholesale and retail)
2. Merchants or Commercial
3. Heavy Industrial Users (manufacturing)
4. Individual Consumers (residential)
5. Public Administration
6. Special Groups (associations, minority, poor, etc.)
7. Agriculture and Agribusiness

C. Gasoline, Diesel/Fuel Oil

1. Suppliers (producers, wholesalers, retailers)
2. Transportation (heavy)
3. Commercial (light trucking)
4. Industrial (manufacturing)
5. Consumer (individual)
6. Agriculture
7. Special Groups (associations, minority, poor, etc.)
8. Public Administration

D. L. P. Gas

1. Suppliers
2. Heavy Industrial Users
3. Commercial
4. Consumer (individual)
5. Agriculture and Agribusiness
6. Special Groups (associations, minority, poor, etc.)

Based on this criteria, appropriate local agencies such as Chambers of Commerce, local government officials, etc. were contacted to obtain specific names of companies and individuals who might be interested in participating.

As a result, well over 300 names were submitted to the APDC as possible

participants. Each of these people were in turn contacted via letter and questionnaire and invited to participate. The following persons agreed to participate as task force members.

TASK FORCE MEMBERS

Name	Address	Firm	Primary Area Of Interest
W. H. Haddock	Box 298 Damascus, Ga.	Haddock Fertilizer Co.	Heavy User of L.P. Gas
Marvin S. Singletary	Blakely, Ga.	Blakely Peanut Company	Heavy user of natural gas
Arthur L. Chapman	229 Cedar Springs Rd. Blakely, Ga.	_____	Consumer
Fred H. Darden, Jr.	Early Co. High School Blakely, Ga.	High School	Heavy user of natural gas
John Harris	Early Co. Jr. High School	Jr. High	Heavy user of natural gas
Ted Whitehard	P. O. Box 405 Blakely, Ca.	Whitehard Oil Company	Gas. diesel wholesaler
Olin Fletcher Thompson, Jr. & Sr.	Blakely, Ga.	Thompson Pontiac Buick	Auto and farming
Wayne Foster	P. O. Box 568 Blakely, Ga.	UBBK Radio	Consumer
Joe A. Cannon	649 Howell Ave. Blakely, Ga.	Early County Elem. School	Heavy user of natural gas
W. C. Brown	Albany, Ga.	Chamber of Comm.	Municipality
John Varino	405 Maxwell Dr. Albany, Ga.	Olinkraft	Heavy user of natural gas
Mrs. Anne L. King	P. O. Box 3170 Albany, Ga.	Bob's Candies	Heavy user of natural gas
Harvey Cohen	P. O. Box 507 Albany, Ga.	F & S Ser. Inc.	Heavy user of natural gas
Bruce Green	P. O. Box 1604 Albany, Ga.	Green's Propane Gas Service	L.P. Gas wholesaler
Reba W. Stewart	Box 1309 Albany, Ga.		Consumer
James Ruis	Texaco Dist. Sales Of. Albany, Ga.	Tracey's Tex. Sta. from Pelham	gas retail

Name	Address	Firm	Primary Area of Interest
Laurie Langston	2700 Palmyra Rd. P. O. Box 1668 Albany, Ga.	Interstate Truck Leasing Company	Trucking
C. M. Pippin, Jr.	Pretoria Road Albany, Ga.	Shamrock Ranch	Farmer
Russell Knight	P. O. Box 1747 Albany, Ga.	Charmin Paper Products	Heavy user of natural gas
Don West	P. O. Box 826 Albany, Ga.	Haley Farms	Farmers
L. S. Thompson	P. O. Box 643 Albany, Ga.	Gillionville Plantation	Farmers
Richard Sinclair	P. O. Box 3289 Albany, Ga.	M&M Mars	Heavy user of natural gas
Don Holloway	P. O. Box 1613 Albany, Ga.	Modern Gas Co.	L. P. Gas Wholesaler
Tom Dykes	City of Albany Albany, Ga.	City	
R.T. Crozier, Jr.	835 Rose Circle B'bridge, Ga.	Columbian Peanut Company	Heavy user of natural gas
D. M. Langston	Bainbridge	Pepsi-Cola Bottling Co.	Consumer
Jim Mitchell	109 Morningside Dr. B'bridge, Ga.	Belk Simpson Company	Merchant
John White	1030 E. Shotwell Bainbridge, Ga.	Skeet's Exon Station	Wholesale & Retail Gas
Guy Barber	P. O. Box 2406 Bainbridge, Ga.	S. W. Georgia Oil Co., Inc.	Retailer of Gas
Alfred H. Rogers	928 Hall St. Bainbridge, Ga.	Turner Farm Co.	Merchant
T. V. Montee	P. O. Box 766 Bainbridge, Ga.	Kaiser Agri - Chemical	Heavy User of natural gas
Marvin Fowler	P. O. Box 496 Bainbridge, Ga.	Chevron Dist.	Wholesale gas
Swift Fresh Meats Co.	Post Road Moultrie, Ga.	Swift's Meat Co.	Heavy users of Natural gas
Bill Beetcher	5-9 E. Central Ave. Moultrie, Ga.	Belk Hudson's	Retailers

Name	Address	Firm	Primary Area of Interest
Herman Friedlander	1st. S.E. Moultrie, Ga.	Friedlanders	Retailers
W. E. Crozier	P. O. Box 45 Whigham, Ga.	Grady Farm Center, Inc.	Heavy user of L. P. Gas
John B. Wright, Jr.	P. O. Box 390 Cairo, Ga.	Wright Nurseries Inc.	Heavy user of LPGas
Richard Porter	126 S. Broad Cairo, Ga.	Porter's	Merchant
Mickey Doss	P. O. Box 545 Cairo, Ga.	Three County Petroleum	Gas & Diesel Sales
Gary Elkins	P. O. Box 60 Cairo, Ga.	W. B. Roddenbery Company, Inc.	Heavy user of natural gas
Larry Higdon	Hadley Ferry Rd. Cairo, Ga.		Consumer
Charles Lodge	Farmers State Market Pelham, Ga.	Lodge Farm	Farmers
J. A. Dyfel	P. O. Box 468 Pelham, Ga.	Pelham Phosphate Company	Heavy user of natural gas
	American Oil Co. Camilla	Lewis Peanut, Grain, Fert. Co.	Heavy user of LP Gas
C. K. Cox	Route 1 Box 171 Camilla, Ga.	Hopeful Peanut & Milling Co.	Heavy user of L. P. Gas
Richard Royal	P. O. Box 313 Camilla, Ga.	Royal Ford, Inc.	Merchant
Walter Geiger Paul Worley	Camilla, Ga.	Cagle's, Inc. Royal Division	Heavy users of natural gas
Frank McMinn's	231 Maryland Dr. Camilla, Ga.	McMinn's Ser. Station	Gas & diesel sales (retail)
James McIllvaine	P. O. Box 27 Camilla, Ga.	Exxon (Dist.)	Diesel & Gas Sales
Lynn Autry	P. O. Box 123 Camilla, Ga.	Autry Petrol. Co.	Gas & Diesel sales
James Lee Adams, Jr.	Route 3, Box113A Camilla, Ga.	J. L. Adams Farm, Inc.	Farmers
William Cane	P. O. Box 349 Camilla, Ga.	N. American Refrigerated Wrhs.	Heavy users of natural gas
Joe B. Adams	P. O. Box 152 Camilla, Ga.	J. B. Adams & Son, Inc.	Farmers

Name	Address	Firm	Primary Area Of Interest
Marion Roberts	Chamber of Comm. Donalsonville, Ga.	Chamber	Municipality
Lewis Hay	P. O. Box 474 Donalsonville, Ga.	Gold Kist Peanut	Heavy user of natural gas
L. W. Jernnigan	P. O. Box 545 Donalsonville, Ga.	Dity Dry Cleaners	Heavy user of natural gas
Bobby Locke	P. O. Box 148 Dawson, Ga.	Locke Farm Manage. Sys.	Merchant Agri-Business
W. P. Smith	Dawson Ga.	Steven's Ind. Inc.	Heavy user of natural gas
Cecil Boyd	Rt. 5, Box 20K Dawson, Ga.	Boyd Land Service	Consumer & Trucking
Tom Dykes	Dougherty Co. Gov. Building Albany, Ga.	City of Albany	Supplier
Bill Shingler	City Hall Blakely, Ga.	City of Blakely	Supplier
John Walker	City Hall Cairo, Ga.	City of Cairo	Supplier
Ruth Hawkins	P. O. Box 37 Doerun, Ga.	City of Doerun	Supplier
Charles Tyson	P. O. Box 580 Moultrie, Ga.	City of Moultrie	Supplier
Wayne Callaway	City Hall Sylvester, Ga.	City of Sylvester	Supplier
John Baxter	City Hall Thomasville, Ga.	City of T'ville	Supplier
Joe Palmer	City Hall Camilla, Ga.	City of Camilla	Supplier
Elizabeth S. Grose	City Hall Whigham, Ga.	City of Whigham	Supplier
David Bell	City Hall Dawson, Ga.	City of Dawson	Supplier
Mickey Williams	P. O. Box 327 Edison, Ga.	City of Edison	Supplier
Mabel Cobb	154 E. College St. Colquitt,Ga.	City of Colquitt	Supplier

Name	Address	Firm	Primary Area Of Interest
Bill Cain	City Hall Pelham, Ga.	City of Pelham	Supplier
Dorothy E. Johnson	P. O. Box 308 Donalsonville, Ga.	City of D'ville	Supplier
Ed Bradley	P. O. B ox 158 B;bridge, Ga.	City of B'bridge	Supplier
Pearl James	P. O. Box 47 Meigs, Ga.	City of Meigs	Supplier
Robert C. Sise	P. O. Box 791 T;ville, Ga.	South Georgia Natural Gas	Supplier
F.F. Stacey	3951 Snapfinger parkway Decatur, Ga.	Ga. EMC	Supplier
Francis Clark	270 Peachtre, N.W. Atlanta, Ga.	Ga. Power Co.	Supplier
Jack Houston	315 Ponce De Leon Ave. P. O. Box 639 Decatur, Ga.	Gas. Assoc.	Retailer of Natural Gas
Francis Alden	2996 Grandview Ave. Atlanta, Ga.	L.P. Gas Association	Supplier
Adron Harden	2960 Riverside Dr. P. O. Box 768 Macon, Ga.	Farm Bureau	Farmers
Bill Edenfield	P. O. Drawer 387 Cairo, Ga.	City of Cairo	Supplier
Paul Culberson	P. O. Box 226 Camilla, Ga.	City of Camilla	Supplier
Thomas Larson	1233 E. Shotwell Bainbridge, Ga.	City of B'bridge	Supplier
Temp Davis	127 N. Jackson Albany, Ga.	Ga. Power	Supplier
Gene Nuss	10 Pryor St. Bldg. Atlanta, Ga.	Elec. Cities Cooperative	Elec. Assoc.
Robert P. Grey	200 Grey Creek Drive Athens, Ga.	Engineering	Engineering Consultant
Jim Hart		Gulf Oil Corp.	Gov. Affairs
Ima Rude	P. O. Box 405 Dawson, Ga.	Terrell Co. Chamber of Com.	Supplier

Name	Address	Firm	Primary Area of Interest
George Hansen	P. O. Box 487 Moultrie, Ga.	Colquitt Co. Chamber of Com.	Supplier
Lloyd E. Eckberg	P. O. Box 560 Thomasville, Ga.	T'ville Chamber of Commerce	Supplier
Marion B. Roberts	P. O. Box 518 Donalsonville, Ga.	D'ville-Seminole Co. Chamber	Supplier
Donahue Tennyson	P. O. Box 151 Pelham, Ga.	Pelham Chamber of Commerce	Supplier
Mobley Howell	P. O. Box 189 Blakely, Ga.	Blakely Chamber Of Commerce	Supplier
Charles L. Skinner	500 Piedmont Ave. Atlanta, Ga.	Ga. Motor Trucking Association, Inc.	Trucking Assoc.
Clifford Lee	Post Office Camilla, Ga.	Cooperative Experiment Service	County Agent
Sam Lofton	Courthouse Moultrie, Ga.	Co. Admin.	Co. Gov.
Ed Brooks	Courthouse Sylvester, Ga.	Co. Admin.	Co. Gov.
Robert J. Clinton	P. O. Box 1219 Moultrie, Ga.	Community Action Council	Poor
Ted Heiland	P. O. Box 346 Camilla, Ga.	Area Agency on Aging	Aging

The preceeding list seems quite impressive in terms of interest and participation. However, many of those listed did not actually participate or make contributions to the project. In fact, as the reader will note in subsequent paragraphs, citizen participation was very low. Rather than gloss over this problem of lack of participation, it is appropriate to face the issue. There is a definite lesson to be learned as follows. Any substantial progress in energy management or conservation will not be achieved on a voluntary basis on the part of the individual-be it residential, industrial (large or small), etc. Energy management and conservation will only come from those dispensing energy, either through legislation or official policy of some type. It should be emphasized that this does not necessarily mean that Federal or State should dictate that policy.

However desirable and idealistic the notion that the individual will voluntarily manage or conserve energy, it is probably the most significant stumbling block to any progress in energy management.

In any event, it was decided that a series of local meetings of energy task force members would be held in various towns within the substate area. The first such meeting was held in Albany, Georgia, at the local Chamber of Commerce office. Attendance was fairly good with some eight or ten people present. The results of the meeting are reflected and incorporated into the total study.

The second meeting held was an area wide meeting (14 counties) in which all task force members were invited to a central location. Attendance was extremely poor.

While the attendance was poor, problems other than attendance (at both meetings) were more disturbing. The main problem was a failure to really focus in on management. Instead, the individuals appeared to be frustrated with national federal policy and tended to use the meetings as a means of voicing their frustrations. It was clear that many recognized the seriousness of the problem but

had little faith that local people could contribute to the solutions.

In short, the meetings did not appear to be providing significant input relating to management and conservation. Consequently, the APDC staff members involved in the project decided to make some adjustments in procedure.

Rather than holding formal meetings, some of the individuals on the task force were contacted on a one-to-one basis. This proved to be a much more effective means of achieving input.

By making this adjustment, the task force was used more effectively in that it was easier to zero in on some of the management problems, and it is felt that the report reflects the ideas of those on the task force who have given some serious thoughts to the energy problems..

BASIC DATA FOR QUANTITATIVE PROBLEM IDENTITY

Having determined the scope of the project and organized a task force, it became necessary to obtain certain basic or preliminary data in order that problems could be further identified and quantified, to some extent.

Suppliers of various energy sources were interviewed in some detail, and historical records were studied in some detail. State and Federal Agencies such as the Federal Power Commission, the State Department of Transportation and others were interviewed; and historical records maintained by these agencies were studied in some detail. Many other examples could be cited; but the idea was to obtain as much data as possible that could be used to identify the nature and extent of the problem, as well as to stimulate the task force to address specific problems. It should be emphazied that this "preliminary data" is "preliminary". That is, in many cases, it points out a need for additional and more refined data.

ORGANIZATION OF REPORT

As implied already, and as is obvious to anyone who has given serious thought to energy analysis and management, the development of a systematic approach (which is what program design is all about) in terms of evaluation, as well as presentation, is very difficult.

This, again, is due to many factors, some of the most important being the overlapping and interrelationships of the various energy sources; and the fact that energy, as such, directly impacts on all segments of the economy and in so many ways.

After giving considerable throught to the problems, it was decided that the following format or structure would be used to discuss and present each of the energy sources considered.

I. Demand Related Considerations

II. Supply Considerations

III. Impact Analysis Considerations

IV. Possible Management and Conservation Practices

V. Summary of Recommended Approach

The writers are fully cognizant of the fact that one of the key responsibilities of the project was to identify problems, and to identify the role players and the possible role of these players in the management process. There are many problems pinpointed throughout the discussion of each energy source. Also, the potential role players in the process are identified throughout the discussion. In short, in the interest of a systematic approach, the previously indicated format was used; and the problems were discussed as they presented themselves regardless of whether the writer was referring to demand, supply, impact or possible management practices.

A summary is provided, however, which hopefully will indicate the key elements of the plan including problems.

ELECTRICAL POWER

I. DEMAND

A. Energy (KWH)

Electrical energy in the substate area is provided by three types of sources-municipalities, Electric Membership Co-ops and Georgia Power Company.

1. The following municipalities purchase power from Georgia Power and the Southeastern Power Association; and, in turn, they resell this power to their customers. Obviously, all of this power is consumed within the boundaries of the substate area.

Albany, Georgia	Moultrie, Georgia
Thomasville, Georgia	Doerun, Georgia
Cairo, Georgia	Brinson, Georgia
Blakely, Georgia	Whigham, Georgia
Sylvester, Georgia	Camilla, Georgia

2. The following Electric Membership Cooperatives purchase power from Georgia Power and the Southeastern Power Association; and, they resell this power to their customers.

Colquitt County EMC - Moultrie, Georgia
Mitchell County EMC - Camilla, Georgia
Grady County EMC - Cairo, Georgia
Three Notch EMC - Donalsonville, Georgia
Sumter County EMC - Americus, Georgia
Pataula County EMC - Cuthbert, Georgia

The geographical area served by these six EMC's includes all of the relevant substate area. However, it also includes some areas outside the substate area.

3. The remaining area or customers in the substate area are served directly by Georgia Power Company. Details regarding customer service areas were not immediately available. The program implementation should include this information.

Again, the Georgia Power district offices do not correspond precisely with the boundaries of the 14-county APDC area. The geographic area served by these district offices will include all of the relevant substate area. However, it will also include some areas outside the substate area.

This breakdown of electrical energy sources has significance in terms of estimating previous consumption and projected consumption of electrical energy. Certain basic data is necessary for energy planning, and consumption or demand is certainly one of the required data areas.

MUNICIPALITIES

Each of the ten municipalities (1 above) are required to submit an annual report to the Federal Power Commission (copy attached) (Exhibit I). This report shows the energy consumed (KWH) by years, by sector - ie. residential, commercial, industrial, special uses and transmission losses. This same report shows the peaks by months for the various years and, of course, the peak for each of the years (KW).[1]

The Federal Power Commission in Atlanta maintains these files over a several year period. The writers obtained the amount of energy consumed (KWH) by each of the ten municipalities for the period 1965 - 1974. These data were aggregated for the ten towns and are shown in Chart 1.

While a program design does not call for detailed analysis of data and, instead, usually suggests the procedures methodology, types, and sources of data needed and otherwise describes the "how"; it does behoove the designer to use some preliminary data which may suggest ideas, etc. that would improve design.

Observation of Chart I shows that the aggregated total consumption for the ten towns in 1965 was approximately 510 million KWH. By 1973, consumption had

[1]There is a certain lack of consistency in some of the reports regarding peak demand. Some reflect billing peak demands rather than actual peak demands. Adjustments, then, have to be made.

Schedule 3

ELECTRIC POWER RECEIVED FROM OR DELIVERED TO OTHER SYSTEMS

1. Show total receipts and total deliveries for resale separately for each interconnection point, except for transactions with industrial companies in which case only receipts should be shown; deliveries to industrial companies should be entered in schedule 4. **Do not show net figures.**
2. List all connections with utilities, public or private (including rural cooperatives), through which energy can be received or delivered, and all connections with industrial companies from whom energy can be received, whether there were any transfers during the year or not. Mark and identify all locations of interconnection on maps and diagrams to be furnished for Schedule 6, page 4.

Name of Other Utility System or Industry (List systems which are physically intertied with respondent's system) (1)	Location of Interconnection (Nearest town) (2)	Capacity of Interconnection kva (3)	Electric Power Received		Electric Power Delivered		Characteristics of Power Transfer	
			Kilowatt-hours (4)	Maximum Kilowatts (5)	Kilowatt-hours (6)	Maximum Kilowatts (7)	Volts (8)	Phase and cycles (9)
		Total[1]		X X X		X X X	X X X X	X X X X

[1] Should equal totals shown in schedule 2, columns 4 and 5, respectively.

Schedule 4

ENERGY DELIVERED TO ULTIMATE CONSUMERS

The energy use classifications employed in this schedule are defined or clarified below for those classifications which may not be self-explanatory:

Farm, Excluding Irrigation and Drainage Pumping.—In order to facilitate reporting this classification of energy, farm may be defined in accordance with respondent's own interpretation. For guidance, the Bureau of the Census' definition of a farm may for the purposes herein be redefined briefly as a tract of land of three acres or more (less than three acres if value of products sold is $150 or more for the year) on which agricultural operations are performed; the land operated by each tenant, renter, cropper, or manager is considered a separate farm. Respondent should report farms served rather than farm dwellings served in the column for number of customers. Estimates should be furnished for this classification if exact information is not available.

Irrigation and Drainage Pumping.—Estimates should be furnished for this classification if exact information is not available.

Nonfarm—Residential.—Energy supplied for nonfarm residential and domestic purposes, including cooking and water heating. Where electric energy was supplied through a single meter for both residential and commercial purposes include it in the one or the other, according to its principal use. Exclude energy supplied to farm customers.

Electrified Transportation.—Energy supplied for the propulsion of cars, locomotives, or coaches. Energy for office buildings, depots, shops, signal lights, etc. should be reported under "Commercial" or "Industrial," as appropriate.

All Other.—Energy delivered for ultimate consumption that does not fall within any of the specific classifications listed in this schedule. Included in this group should be deliveries for municipal water pumping; oil and gas pipe line pumping; military camps and bases; and public buildings such as schools, police stations, and post offices.

Classification of Energy Delivered to Ultimate Consumers (1)	Number of Customers at End of Year[1] (2)	Kilowatt-Hours (3)
1. Farm, excluding irrigation and drainage pumping		
2. Irrigation and drainage pumping		
3. Nonfarm—residential		
4. Commercial		
5. Industrial		
6. Street and highway lighting		
7. Electrified transportation		
8. All other (give details, if relatively large)		
9. Total energy delivered to ultimate consumers		
10. Transmission and distribution losses and energy unaccounted for (line 11 minus line 9)		
11. Net energy for system (from Schedule 2, column 6)		

[1] Report number of farms, residences, commercial establishments, etc., and not the number of meters where different.

EXHIBIT 1

Power System Statement of ..... for the Year Ended December 31, 1974

Schedule 5

A. SYSTEM DEPENDABLE AND ASSURED CAPACITY AS OF DECEMBER 31

	Kilowatts
1. Net dependable capacity available from:	
(a) System fuel plants	
(b) System hydro plants	
(c) Total	
2. Capacity available from firm purchases:	
From:	
Total	
3. Firm obligations to other systems:	
To:	
Total	
4. Net dependable capacity plus net purchases (1 (c) plus 2 minus 3)	
5. Reserve capacity required:	
(a) Total reserve for system	
(b) Available through interchange or emergency agreements	
(c) Reserve capacity required to be supplied by own system (a) minus (b)	
6. Net assured system capacity (4 minus 5 (c))	

DEFINITIONS

1. "Net dependable capacity" is exclusive of capacity required for station use and is defined as the load-carrying ability of all capacity which can be relied upon to be available for active or standby service at the usual time of annual system peak.

2 and 3. Firm purchases and obligations are defined as the amounts of power (which are expected to be available at usual time of system peak) stated in contracts. If it is not a single, definite, fixed amount, explain in footnotes. It is desired that corresponding items reported be in agreement as between the affected companies. *It is, therefore, suggested that the companies concerned agree upon the figures to be reported.*

5. "Reserve capacity required" refers to:

(a) Total reserve capacity required to maintain adequate service whether from generating units on own system or from other sources, such as interconnections with other plants or systems. In general, the largest reduction in dependable capacity which might result from an outage of a generator or boiler unit determines the minimum reserve capacity required.

(b) The amount of reserve capacity considered to be available through interconnections.

(c) The amount of reserve capacity which must be supplied by respondent's generating plant(s).

B. CONTEMPLATED CHANGES IN CAPACITY

List below all contemplated alterations, additions, or retirements in system generating plants and main transmission facilities, and changes in firm power contracts with other systems:

Description of Change (Give plant name, type and location, line or contract description, where applicable) (1)	Date Month—Year		Contract Change or Name-Plate Rating (Kilowatts) or Line Capacity (kva) (4)	Effect in Kilowatts on—		
	Start (2)	Completion (3)		Net Dependable Capacity (5)	Reserve Capacity [5 (c), above] (6)	Net assured capacity (7)

Schedule 6

MAP OF ELECTRIC SYSTEM

Attach to both the original and first copy of this statement, up-to-date maps or sketches of system facilities, or marked city maps, showing the geographic location of power plants, principal substations, power lines, all connections and transfer points with other systems, also the boundary line of the area served together with the communities supplied therein with electric energy. Show for each high voltage line of 22 kv. and above or any other line regardless of voltage, which constitutes the tie lines between generating stations or from generating stations to high voltage systems of 22 kv. or above, the length in miles; the voltage at which it is operated and the voltage for which it is insulated if different than the operating voltage; and for all alternating current lines show the number of cycles per second and the phase (one-phase, two-phase, or three-phase). Indicate size of conductors for all lines and show whether they are copper, aluminum, or otherwise. Show ratings and locations of transformer banks at power plants and principal substations including interconnections with other systems. Indicate approximate scale (feet per inch or miles per inch) on maps, sketches, or drawings. **If sketches or maps previously furnished represent conditions at the close of the year of this report a notation should be made as to their accuracy and the year submitted, as follows:** Maps submitted with F. P. C. Form No. ....., for the year 19....., correct as of December 31, of the year herein reported.

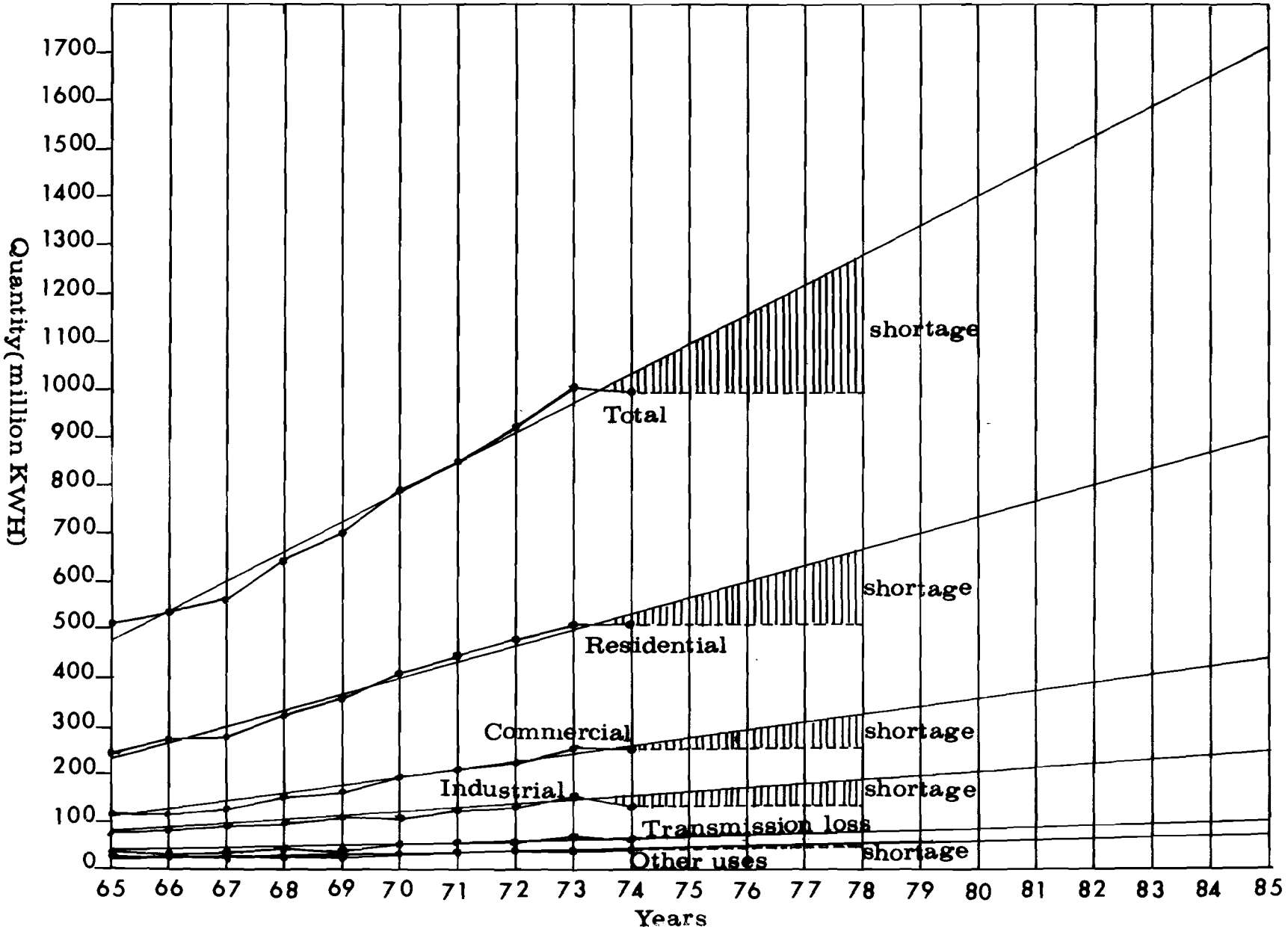
Attest:

I have examined the foregoing statement and certify that the answers to the inquiries therein are as full and complete as can be supplied from the records and that they are true and accurate, to the best of my knowledge and belief.

(Signature of responsible engineer or executive officer) (Title)

(Name typewritten or printed) (Date)

Electrical Energy Consumption
By Sector, Ten Southwest Georgia
Electrical Retail Municipalities
1965 - 1974
with Demand Projections to 1985
(Millions KWH)



reached 1,023 million KWH, an increase of 100.5 percent or an annual increase of 12.56 percent per year for the eight-year period. However, consumption decreased in 1974 to 996 million KWH.

Apparently, this decrease was due to a combination of factors; (1) General economic recession or state of the economy - a no-growth period (2) Energy conservation on a voluntary basis (3) Response to high energy prices - strictly price motivated (There were no physical shortages of electricity during this period as was the case with petroleum products). It is important and would provide significant insight into devising management approaches if the relative importance of each of these factors could be delineated or isolated.

The program design should address itself to the delineation of these factors. This would involve a detailed analysis of the number of customers and change in the number of customers, the type customers and change in type of customers to include impact of the housing industry changes, etc. Employment and other factors could be correlated with energy consumption. In short, the role of the general economy in reducing consumption could be isolated.

With regard to the patriotic voluntary reduction as opposed to pricing, consumer surveys may be required as well as analyzing response to recent rate increases by analyzing billing data. Once this was accomplished, a better "feel" for the elasticity of demand for electrical energy could be obtained. The price of alternative energy sources would also be included in the model.

Further observation of Chart I shows that, in 1965, 47.6 percent of the KWH was consumed by residential customers; and, in 1973, the percentage was 50.3. In 1974, the percentage was slightly higher at 50.6.

This illustrates several points. The largest single group of users of electricity is residential. It also illustrates that an increasing percentage of the electrical energy is consumed by the residential sector. Furthermore, the 50.6 percentage in 1974 suggests that the residential sector reduced consumption in about the same proportion as did other sectors.

Chart I also shows a crude projection of electrical energy consumption to 1985, which assumes the same trend observed between the 1965 - 1973 period (excludes 1974).

By 1985, under these assumptions, energy consumption would amount to 1,700 million KWH, or an increase of 166 percent between 1973 and 1985 for the twelve-year period or 13.8 percent per year.

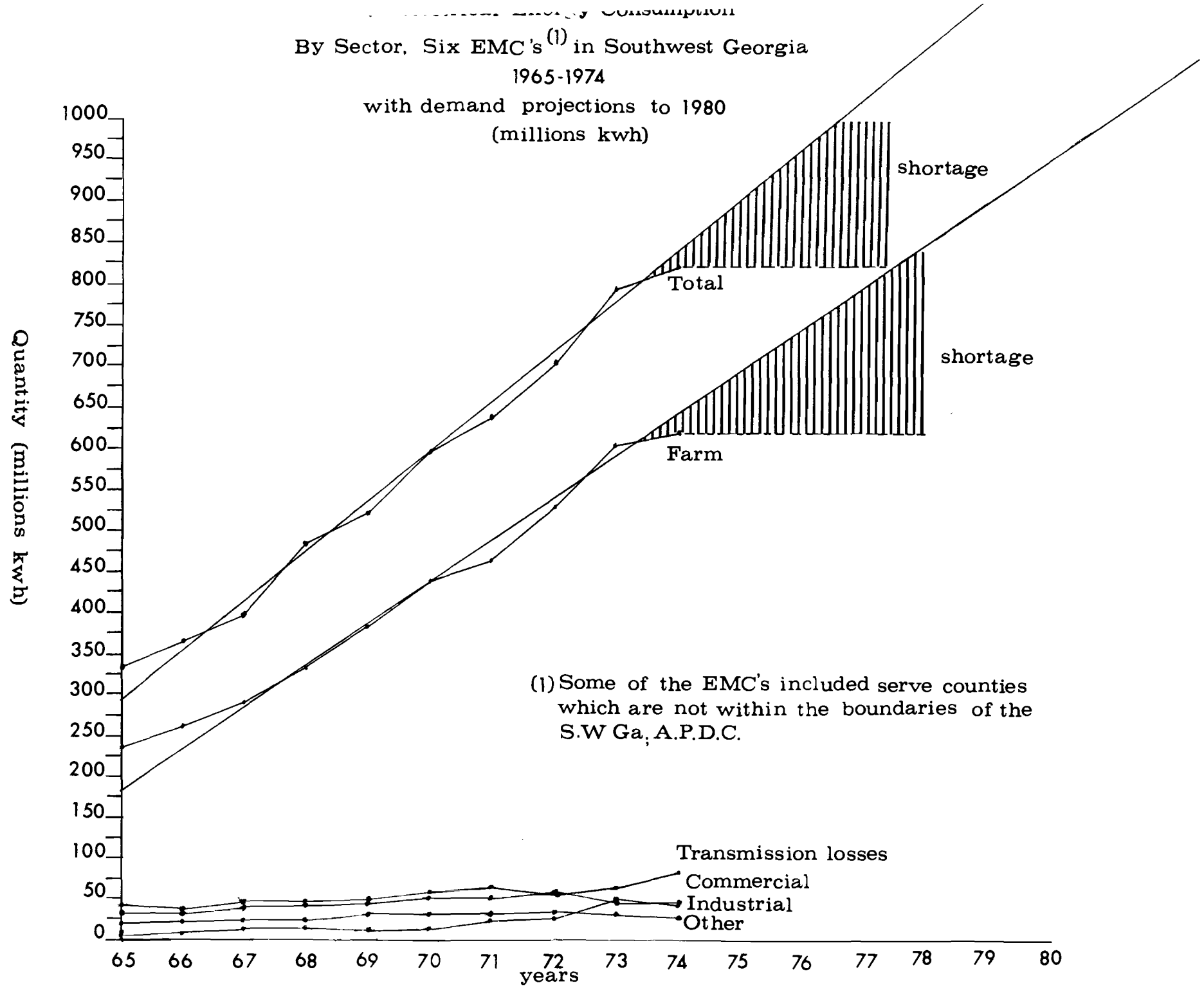
By contrast, Chart I also shows the difference in consumption if the area planed out at 1974 levels of consumption.

More detailed analysis of these data as described above would be essential in analyzing the role of pricing or rate structures in terms of energy conservation and management, as well as providing keys to projected demand in constructing additional generating capacity. In short, the increased cost of electricity has created a new "ballgame" and it is doubtful that even the large sophisticated power companies can adequately project (based on current knowledge) needs until basic research is accomplished with regard to the intricacies of price response and changes in price of other alternate energy sources.

EMC'S

Chart II shows electrical energy consumption retailed by the six EMC's serving the substate area for the years 1965 - 1974. As already mentioned, boundaries of the APDC do not coincide with the boundaries of the geographic area served by these EMC's. (This data was also available from the Federal Power Commission in Atlanta).

The program design must make admustments for this boundary difference if consumption in the substate area is to be related to various variables such as population, employment, housing, etc. This would have to be accomplished by obtaining detailed maps showing service areas, making estimates or allocation of customers by types, etc. This would have to be related to census tract data


By Sector, Six EMC's (1) in Southwest Georgia
1965-1974
with demand projections to 1980
(millions kwh)
Quantity (millions kwh)
1000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
shortage
Total
shortage
Farm
(1) Some of the EMC's included serve counties which are not within the boundaries of the S.W Ga. A.P.D.C.
Transmission losses
Commercial
Industrial
Other
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
years

since no other delineations of rural population are available.

While this must be accomplished in order to arrive at an adequate set of ratios, etc. on a delineated substate basis, Chart II is presented to give some preliminary indications of trends in the rural sector. In 1965, total energy retailed by these six EMC's was 332 million KWH. By 1973, sales were 797 million KWH, an increase of 465 million KWH or a percentage increase of 140 percent for the eight-year period or an annual increase of 17.5 percent. However, in 1974, total consumption was 820 million KWH reflecting an increase of only 23 million KWH or about 2.9 percent, again, reflecting a significant decrease in the rate of power consumption. Chart II shows that the majority of this power is farm or farm-resident oriented rather than being used for commercial, industrial, etc.

Again, as was the case with the ten cities which purchase and resell power, a detailed analysis of the factors causing this decline would be necessary in establishing rate structures and planning for generating capacities.

GEORGIA POWER COMPANY

Finally, Chart III should be developed which would show consumption in the area served by Georgia Power Company. Again, the APDC area and the Georgia Power Company area does not coincide. The program design must make adjustments for this if energy consumption in the substate area is to be successfully related to various variables already mentioned. The same procedures would apply as described in the EMC section.

AGGREGATED ELECTRICAL ENERGY FOR THE AREA

The next step would be one of aggregating all electrical energy consumption for the three above sources. More will be said later about the use of this data; but, obviously, the reader can see the need for this in order to simply make adequate projections on a substate basis.

Georgia Power Sources

Georgia Power generates the electricity which is sold to the customers.

CHART III

ELECTRICAL ENERGY CONSUMPTION
BY SECTOR, GEORGIA POWER DIRECT CUSTOMERS
IN SOUTHWEST GEORGIA, 1965 - 1974
WITH DEMAND PROJECTIONS TO 1980
(MILLIONS KWH)

NOT AVAILABLE

Coal is the primary energy source used to generate electrical power; and, according to some members of the task force, there is abountiful supply of coal for electrical power generation. There are problems relating to the environment, escalating coal prices with increased demand for coal, including transportation of coal as it becomes more in vogue. These problems may, however, be beyond the scope of a substate area plan for obvious reasons. The point is that, of all the current energy sources, electricity offers the only one with no basic physical limitations, at least in the intermediate run.

Furthermore, there is no correlation between energy generated and energy used in the substate area. Power used in Southwest Georgia may be generaged in North Georgia and vice cersa.

Consequently, the crux of the problem relating to electrical energy is a price problem, not necessarily a supply problem. In short, considerable capital at inflated prices is necessary to support the increased energy consumption reflected in previous pages - unless we choose not to grow. This cost is passed on the the consumers.

This problem then translates into someone at some level managing the electricity in such a way that price increases can be held at a minimu.

B. Demand (KW)

Obviously, if electrical energy consumption continues to grow, considerable investment will be required to satisfy this demand. However, power suppliers generally feel that the problem of peak demand is a more severe problem than the growing energy demand. Peak demand is defined as the peak load recorded for a 30-minute interval on a given day usually occuring in August. The secondary suppliers and retailers (municipalities, EMC's and ultimately the customer) are stuck with this high peak for the following 12 months.

Suppliers say that about 40 percent of the cost of electricity is due to this demand charge, while the remaining 60 percent is due to "energy" charges. In

the case of the municipalities observed, each individual customer is not directly billed for a demand charge. However, the rate structure is such that demand charges are, in effect, passed on to the individual customer. In the case of EMC's, some are initiating individual demand charges. Direct Georgia Power customers (at least the larger users) are also billed a demand charge on an individual basis.

In any event, the ultimate customer pays for the demand charge.

Peak demand data are available, by months, in each of the municipalities and EMC's. It is also available from the Federal Power Commission. Charts IV through X illustrate the variations in peak demand for the years 1970 and 1974 for seven of the ten municipalities (data was not available on the remaining three). A glance at any of these charts vividly illustrates these problems. Compounding this, of course, is the fact that the peaks have increased significantly between 1970 and 1974 in all of these municipalities.

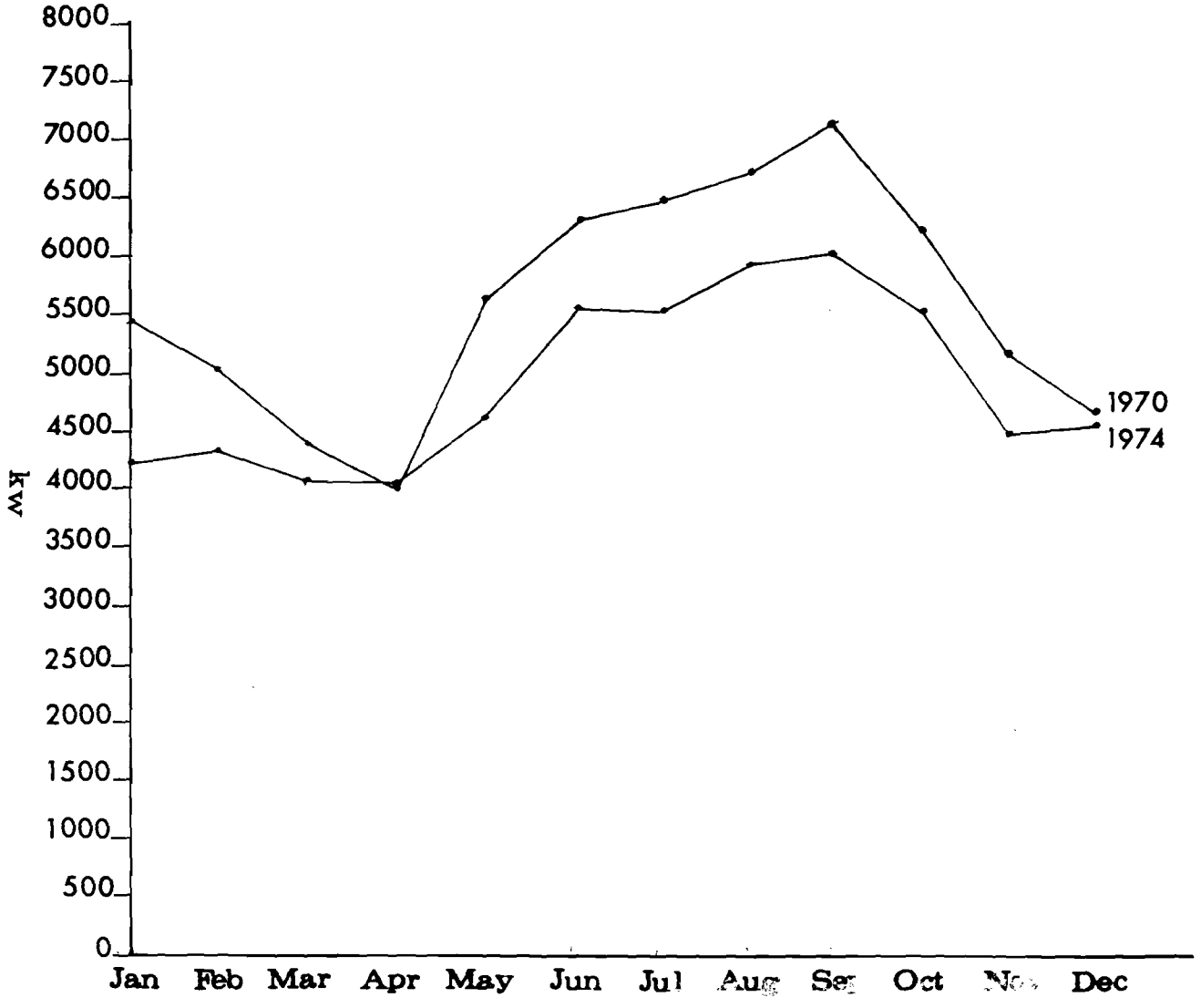
Since peak demand is only presented for two years, (1970 and 1974) additional years should be obtained from the Federal Power Commission and/or the appropriate power sources in order that projections of peak demand could be made.

II. SUPPLY

As already implied, the supply of electricity is a function of the level of investment that the power companies are willing or able to invest since there are no immediate, or even intermediate, physical limitations on supply. There are limitations in the sense that coal prices are and will continue to escalate. Additional transportation facilities may be needed for coal. Also, environmentalists will continue to cause problems relating to coal as a source for generating electricity.

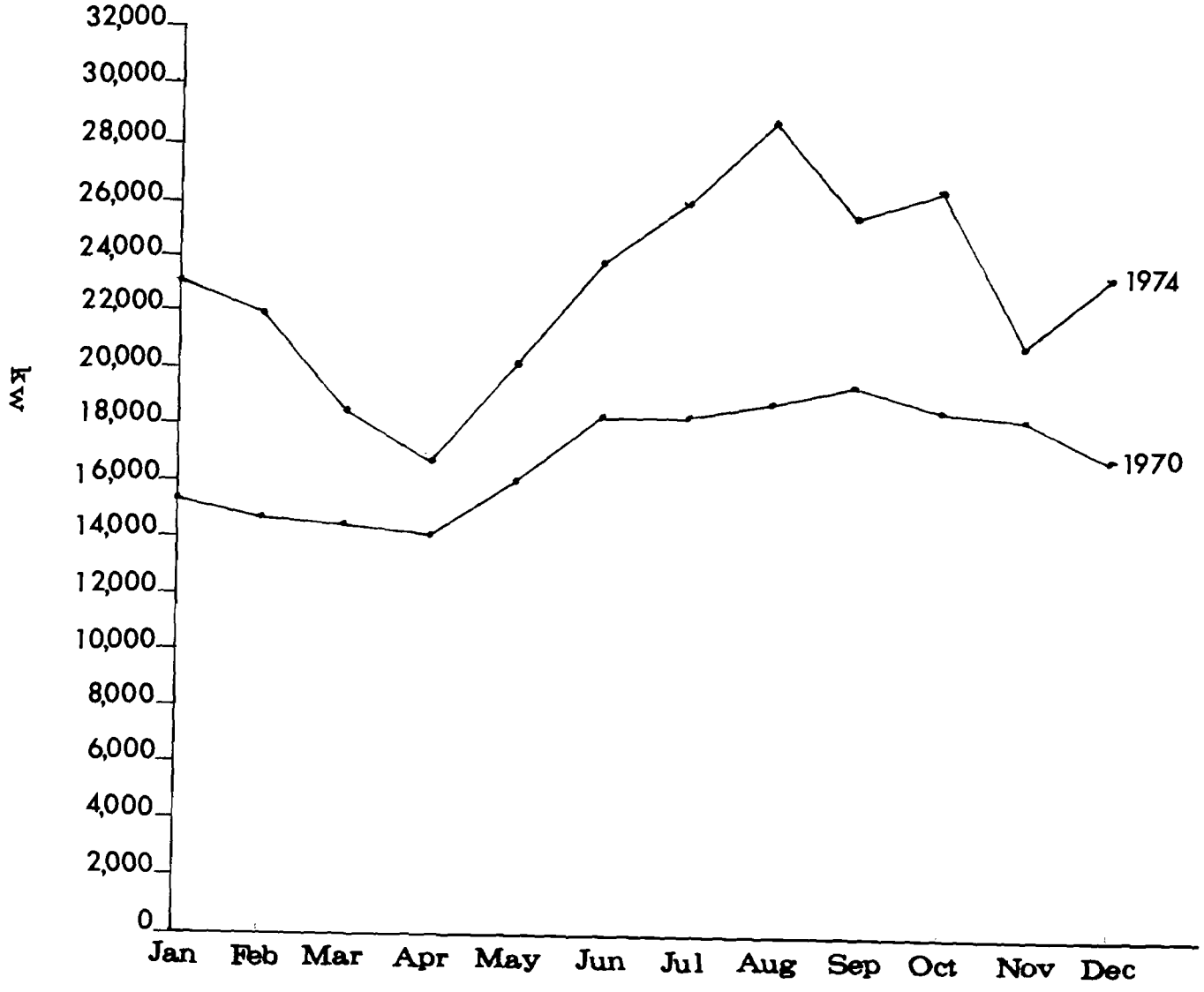
In terms of a substate management plan, localities can assume that electrical power will be in sufficient supply in the short and intermediate run. However, long run considerations may be a different matter.

Chart IV. **Electrical Peak Demand(kw)**
By Months 1970 and 1974
Sylvester, Georgia

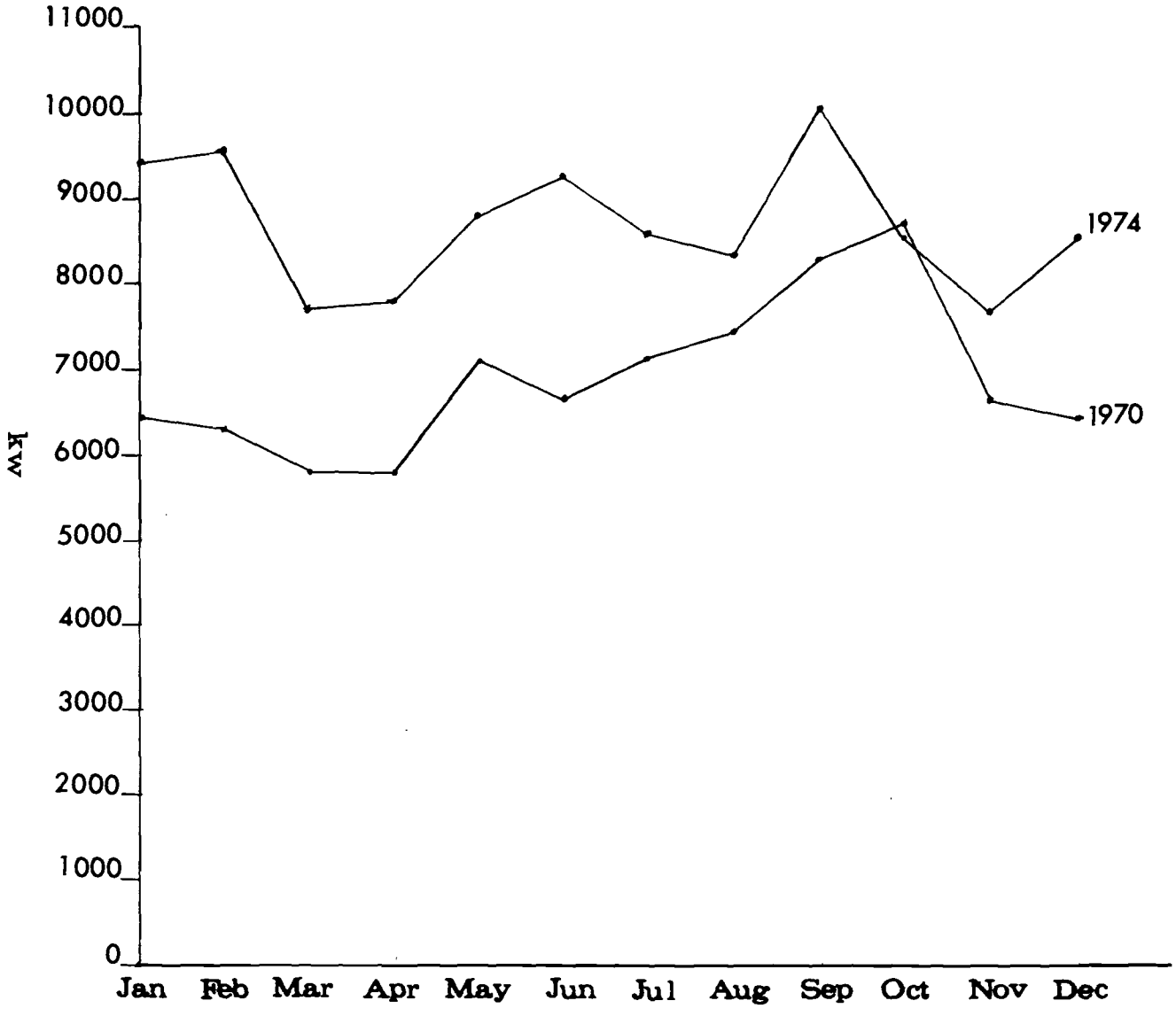


By Months 1970 and 1974

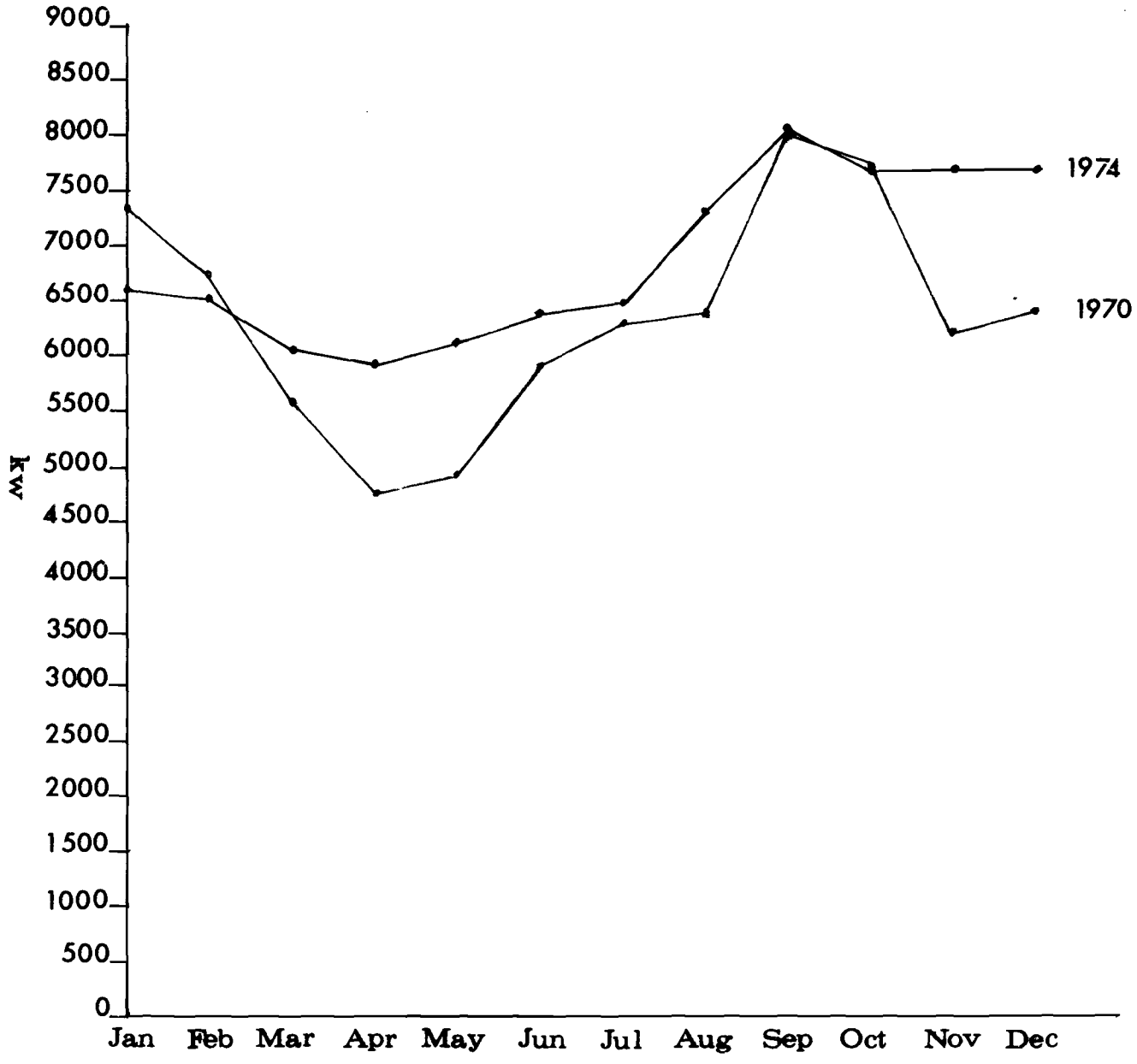
Moultrie, Georgia



By Months 1970 and 1974
Camilla, Georgia

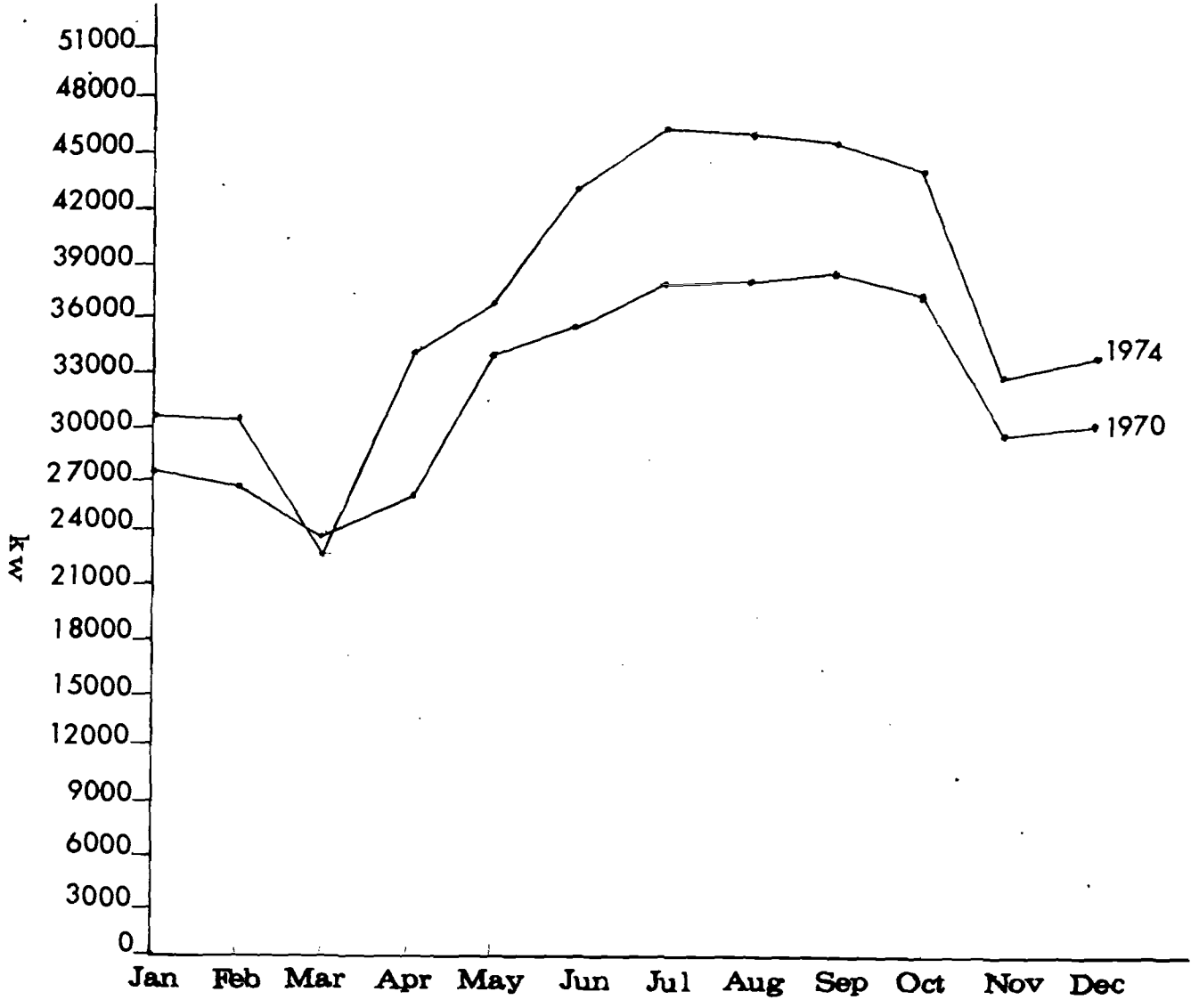


By Months 1970 and 1974
Blakely, Georgia

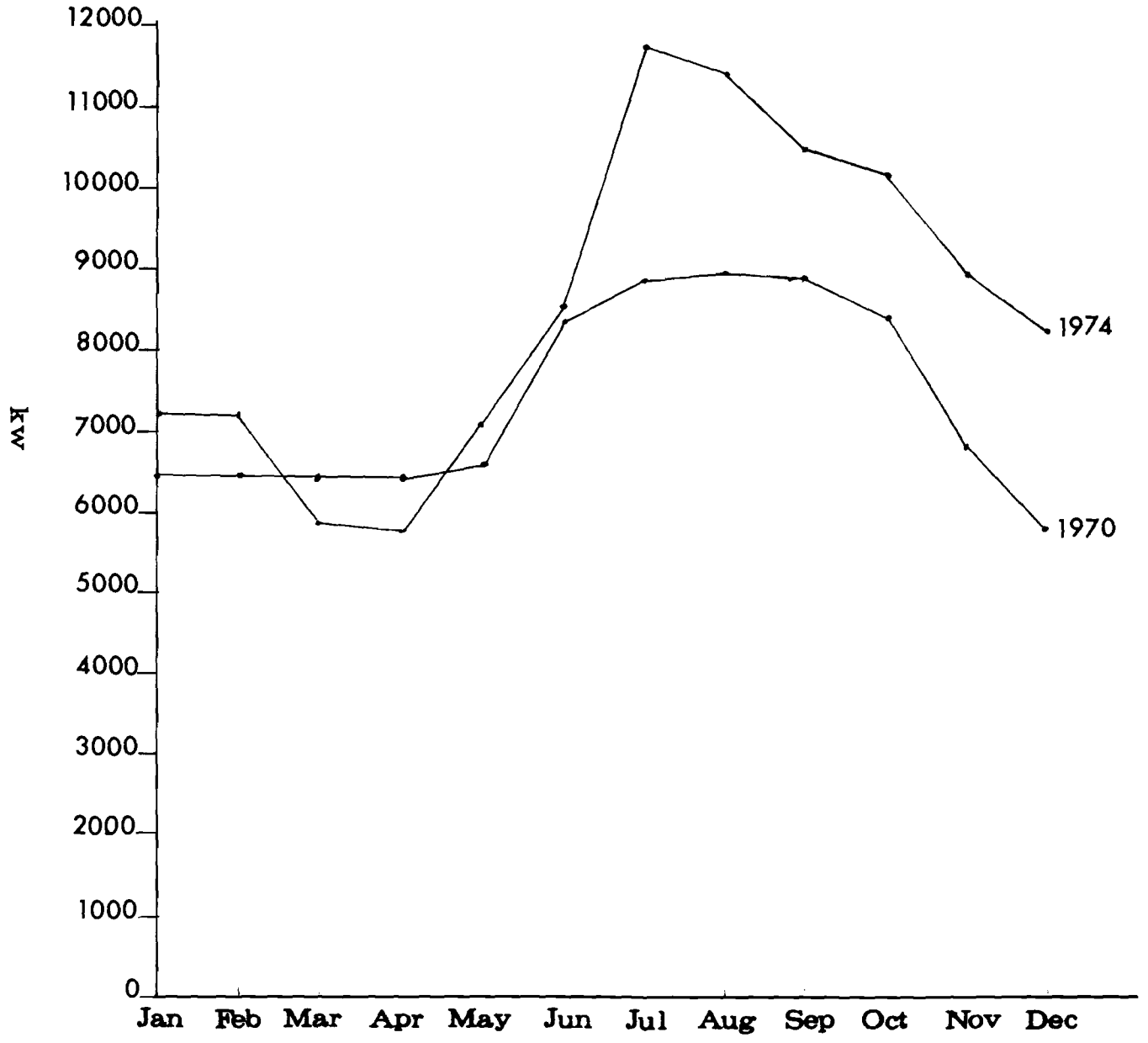


By Months 1970 and 1974

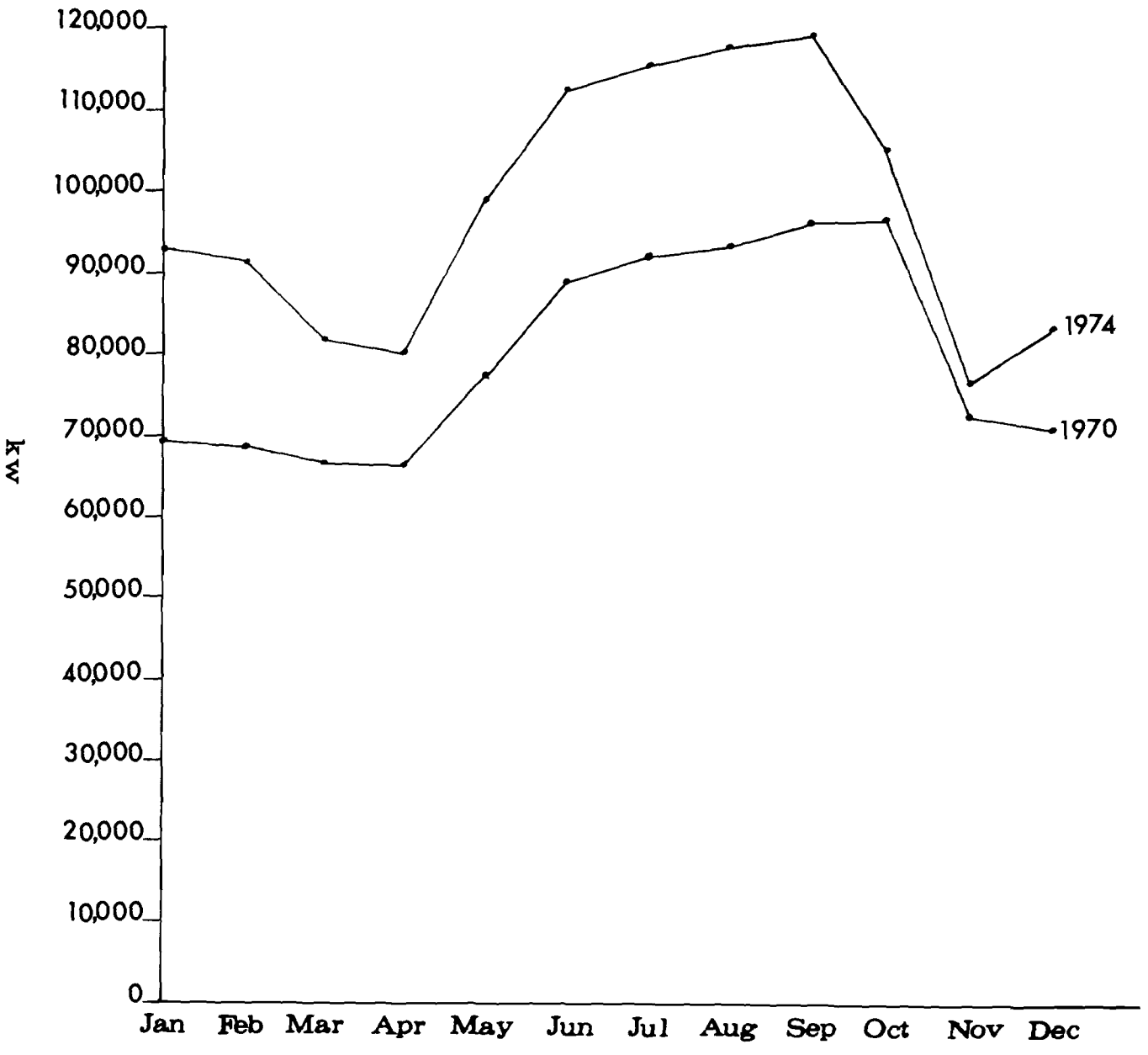
Thomasville, Georgia



By Months 1970 and 1974
Cairo Georgia



By Months 1970 and 1974
Albany Georgia



With regard to supply from the standpoint of sellers of power, it is fairly obvious that the sellers have very little real interest in conserving energy (KWH) per sae, (except during peak periods).. In short, there is a surplus of electricity during the winter months in the substate area and a relative surplus capacity during certain days and hours of the summer months.

The power companies and other sellers are interested in maintaining or increasing revenue obtained from energy sales. They are, however, interested in reducing peak loads. Consequently, it is a load management problem rather than a conservation problem.

III. IMPACT ANALYSIS

In terms of impact analysis, there are several considerations.

A. The question of growth or no growth - ie. - which involves both increasing levels of energy and peak demands. Except for price, there appears to be no limitations on growth. Also, there is no real reason to expect decreases in peak demand except that due to price.

In short, the supply of electric power is such that it can be consistent with growth policies. However, it should be recognized that a growth policy which emphasizes continued energy consumption, even with improved local management, will continue to create a need for more investment in generation capacity. This approach simply delays the investment, but it makes the operation more efficient at any given time.

The impact of a growth policy, then, will be increasing the cost of power to the ultimate user but should deaccelerate the rate.

B. Impact of price on consumer and, hence, economy. Reference was made in III-A above to the impact of price on reducing the growth rate. Certainly, increased energy prices will affect the growth rate as would any other cost factor increase. This is simply a matter of inflation; but as long as the energy rates correspond with the general price level, the impact will be no more or no less than any other cost factor.

C. Impact of price on special groups. Low income groups, the elderly on fixed incomes, etc. are having considerable difficulty with increased costs of utilities, including electricity as well as increasing transportation costs. By the same token, they are also having difficulty with other costs such as food, clothing, etc. Again, it is the broader problem of inflation that is causing the problem. (See Exhibits II, III and IV which reflect the feelings of certain groups toward this problem).

This obviously raises the question of special privileges or special price considerations with regard to energy. This is a social welfare problem - not an energy management problem. Obviously, if the government elected to do so, energy stamps comparable to food stamps could be issued; or any other similar method could be devised. There is a real problem with these groups as well as a real problem with the middle income groups. However, the advisability and desirability of governmental assistance in this area depends on the status of the person being interviewed. Lower income groups would welcome this approach, and the taxpayer would reject the idea unless he stands to gain. In reality, an energy management study should relegate this question to the social welfare field.

IV. SPECIFIC MANAGEMENT PRACTICES

This section is devoted to consideration of various management practices which might possibly be implemented in the interest of managing the electrical power in the substate area. Past discussion has shown this to be a problem relating to peak loads. The task force members unanimously agree that this is the major problem. The relevant question is how to solve it.

A. Voluntary conservation practices. The task forces, as well as the writers, recognize that voluntary efforts have some small impact on the level of consumption in terms of KWH. Yet, the general public is

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
SOCIAL SECURITY ADMINISTRATION
September 22, 1975

REFER TO:

500 Pine Ave.
P.O. Box 1907
Albany, GA. 31702

EXHIBIT III

Mr. Wayne Williams
S.W. Ga. Area Planning and
Development Commission
P.O. Box 346
Camilla, GA. 31730

Dear Mr. Williams:

It is difficult to respond with factual information about the problems our beneficiaries have with the energy crunch. Our contacts with them are of short duration, and we approach their needs from the standpoint of supplying money rather than recognizing expenses. In short it is left to their discretion and good judgment as to what they will spend their money for.

We do hear comments about what it cost to live, but it is difficult to evaluate if the problem is primarily related to the energy crunch or to inflation. For example, many of our beneficiaries still use wood for cooking and heating. Is the high cost of wood due to lack of wood supply (energy crunch), lack of persons willing to cut and haul wood (labor problem), or the cost of acquisition and transportation and labor (inflation)? We can only furnish you some observations and that is that the high cost of utilities is frequently mentioned. This includes gas and electricity. We do not hear as much about transportation, but this is probably due to the fact the beneficiary can call the district office from any place within the service area without cost to him. Also the mini buses which the Neighborhood Service Centers have are providing transportation for many of our beneficiaries as well as friends and relatives.

It is my feeling that inflation is the bigger devil as I have no knowledge of any specific energy product not being available if you could pay for it.

Sincerely yours,

Herbert E. Hawk
Field Representative

Southwest Georgia
PLANNING AND DEVELOPMENT COMMISSION
POST OFFICE BOX 346 · CAMILLA GEORGIA TEL. 336 5616

September 23, 1975

EXHIBIT II

Mr. Wayne Williams
Research Specialist
Southwest Georgia APDC
Camilla, Georgia 31730

Dear Wayne:

With regard to the Energy Conservation Program sponsored by the State Energy Office, I would like to point out some facts that will affect the 60+ population of our Planning and Service Area and a Title III Program of the Older Americans Act of 1965 that has been implemented in this area.

There are 36,976 older Americans in our 14 counties, of which 17,352 are below the povety level. This 17,352 represents 47% of the total 60+ population. Increases in any costs are an increased hardship on these low income people but particularly the increased cost of heating fuels, electricity and gasoline not only affect these people financially, but as a spin off of the financial hardship adversely affect their physical and emotional well being.

As you know a part of our Title III Program is the provision of transportation for the elderly in each of the 14 counties in our area. The program has already been detrimentally affected by increases in our operating cost budget by the spiralling costs of gasoline and associated products. It is foreseeable that this program will of necessity, be forced to be severely curtailed or even eliminated in some areas as our total budget for the calendar year 1976 has been reduced by $4,000. Transportation for the elderly in our area has been identified as the number 2 need with income as number 1. From this you can see the severe impact that the increased costs and the eventual curtailment of transportation will have on our senior citizens who due to the transportation program now have relief from social isolation and access to doctors, dentists, grocery stores, nutrition sites, senior citizens clubs, etc.

I feel that the senior citizens of our area and in other parts of the State and Country as well, deserve special consideration in all aspects of their lives. Therefore, I recommend they be favorably considered as a group to receive special prices for the energy utilities and fuels that they consume.

Sincerely

Theodore R. Heiland
Administrator
Area Agency on Aging

RICHARD M. HARDEN/Commissioner
M.(JIM)PARHAM/Deputy Commissioner

R V. BANKSTON.
AREA NETWORK DIRECTOR

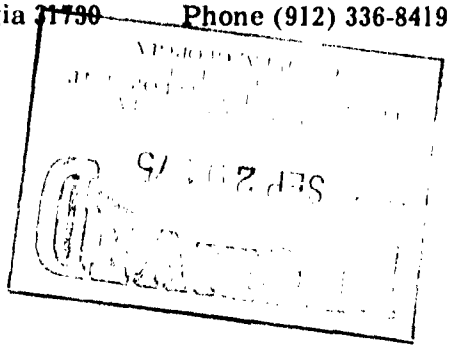
GEORGIA DEPARTMENT OF HUMAN RESOURCES

MITCHELL COUNTY
DEPARTMENT OF FAMILY AND CHILDREN SERVICES

P. O. Box ~~XXX~~ 348
Camilla, Georgia ~~31730~~ Phone (912) 336-8419

September 25, 1975

EXHIBIT IV



Mr. Wayne Williams
Southwest Georgia Area Planning
and Development Commission
P.O. Box 346
Camilla, Georgia 31730

Dear Mr. Williams:

I regret that we are unable to supply you with any concrete data concerning the effect of the energy shortage on our client population. We have not gathered this information for our computer reports. We have only heard our clients verbally complain of the rise in utility costs. We are not sure of the direct cause of this increase.

Transportation continues to be a problem for the SSI Client. Transportation to the doctor or medical facility by a volunteer who is reimbursed 10¢ per mile is available whenever a volunteer is available. The Golden Age Express cannot reach all the over 60 population in the county. I have been advised by the local coordinator that they have been told the bus had been using too much gas so they have had to eliminate out-of-county transportation and some of the routes that they had been running. I believe this is the result as much from the budget cut as from an increase in cost of fuel.

If we can be of further help, please let us know.

Sincerely,

(Mrs.) Sarah M. Jordan
County Director III

(Mrs.) Sandra A. Holton
Casework Supervisor II

SAH/bpg

completely ignorant regarding the significance of peak demand and what could be done to help alleviate the problem. Most of the conservation pleas, literature, etc. ignores this peak problem. This suggests a different public-oriented education program in terms of electrical energy - from conservation to management with emphasis on peaks.

B. Technical innovations for reducing peaks. Some of the task force members feel strongly that one of the best approaches to the peak problem will involve the application of various types of technical innovations. Various examples were given at task force meetings, and others were mentioned when talking with individuals on the subject. This is an excellent approach; and, in the years ahead, manufacturers will be selling equipment with such deveices installed; and other devices will be installed in existing homes and businesses.

However, it appears that, at the current time, there is a limited number of these devices; and many are in the experimental stage.

Consequently, it is suggested that a considerable amount of basic and applied technical research should be initiated in this field in order that this process can be expedited.

C. Local facilitative legislation. Facilitative legislation or policy is defined as legislation or policy that would effectively assist in conserving or managing energy such as strengthening or changing building codes to require more insulation on new construction, etc, or possibly incentives to insulate old structures. Additional research into the identification and details pertaining to other less obvious methods related to construction should be investigated.

Given workable and proven suggestions based on adequate research, the power systems (at least the secondary suppliers) in the substate area probably would be amiable to changing policy toward this end. It should be emphasized, however,

that the benefits must be proven. For example, it would be most difficult, and possibly illegal, to enforce a policy requiring a certain number of inches of insulation when the builder and homeowner is already facing extremely high overall construction costs. Incentives may be the answer.

Another area that would involve policy decisions is in the area of life styles. It should be remembered, that in the substate area, the local municipalities, as suppliers, have a potentially large role to play in the management process. These municipalities face some real practical political problems in utilizing this potential in attempting to enact policies which would significantly change life styles but which would serve to alleviate some of the problems.

For example, schools in the substate area usually open in August. It is possible, and highly probable, that this adds significantly to the electrical peak load. A policy decision could be made to change or delay the school opening dates. Schools could be flexible in different directions in this regard.

If a school is heated with total electricity, then no problems exist in the winter. However, if it is heated with natural gas, the same type problems exist with respect to gas in the winter. These corrective policies could be implemented but would, no doubt, prove unpopular with the general public since vacations, etc. might be affected. Other government operations could also be adjusted in the same manner.

In addition, great care should be exercised with regard to contracting with heavy industrial users that traditionally have been contributing to the peaking problems. This might require shifts in working hours, vacations, etc. Again, this could be a politically unpopular decision.

However unpopular, someone other than the ultimate consumer must make the decisions - for the individual consumer will not volunteer.

D. Pricing or rate structures. With regard to pricing or rate structures as a means of "managing" electrical peak demands, very little is actually known about the responsiveness of the consumer to price changes. Electricity has, in the past, been so low in price that demand was very inelastic - that is, the price had little to do with consumption.

With the much higher current prices, demand may be more elastic and, thus, offer opportunities not only in cutting energy consumption but, more importantly, in managing the peaks. It is the understanding of the writer that some research in this field is now underway. If results are available, it is not known. The severity of the peaks in the electrical systems stand as evidence that no effective rate structure of the type described has yet been applied. It appears that some additional basic research is needed.

While additional research is needed, the writers did obtain a small sample of twenty residential electrical customers in one of the municipalities. This data is presented in Table II, shows the KWH used in the effective price per KWH for July, 1974, and July, 1975. Effective rates were 1.91¢ per KWH in July, 1974 and total KWH for the twenty customers were 33,910. In July, 1975, the effective rate was 2.65¢ per KWH; and KWH consumed were 31,610. In short, effective rates increased 38.7 percent; and consumption decreased by 6.8 percent.

Since this was residential, the reduction in KWH may have been due to price response and or "patriotic" response - probably more related to price response. However, since this is just an illustration and not a representative sample, other factors such as weather or inconsistencies in billing dates could have been involved. Additional research including research in weather patterns should be accomplished.

This, of course, is KWH or energy (not demand) but there should be some relationship of KWH to demand in this regard. This relationship also needs to be established.

TABLE 11

ELECTRICITY USAGE FOR 20 RESIDENTIAL CUSTOMERS
FOR JULY, 1974 AND JULY, 1975 IN A CITY OF 5,000

Account Number	KWH Used		Charge	
	July, 1974	July, 1975	July, 1974	July, 1975
10420	2,560	1,930	$ 46.88	$ 50.45
20120	250	680	8.81	21.77
20545	1,360	1,430	27.10	38.99
30420	720	1,040	16.55	30.03
50200	3,120	2,640	56.10	66.73
60245	1,940	2,010	36.66	52.28
80360	1,130	1,310	23.31	36.23
81230	500	390	12.93	14.45
100290	1,680	1,640	32.37	43.80
101160	4,270	2,330	75.06	59.63
110280	1,910	2,020	36.16	52.52
111130	3,570	2,920	63.52	73.16
120880	2,640	2,270	48.19	58.25
130540	140	150	6.44	7.20
131550	1,040	1,020	21.83	29.58
P0018	80	80	4.69	4.80
P0103	90	140	5.05	6.86
40080	1,590	1,750	30.89	46.32
50335	3,680	4,320	65.33	105.28
120460	1,640	1,540	31.71	41.51
Total	33,910	31,610	649.58	839.84

Cost per KWH used in July, 1974 - 1.91 cents
Cost per KWH used in July, 1975 - 2.65 cents

SOURCE: Utility bills

Tables III and IV represent further efforts to assess the possibilities of pricing. Obviously, this is very crude; and much more work needs to be accomplished through a computer program approach. It does, however, provide an indication of the type work that should be accomplished.

Table III shows actual monthly residential consumption for this city of about 5,000. The reader will note that the effective rate for KWH was at the lowest level during July, August, September and October. This, of course, results from lower rates at higher levels of consumption during the summer months, even though, in this particular city, there is no difference in summer and winter rates.

Table IV represents a "trial and error" hypothetical situation for this same town for the same year. In this case, effective rates were reduced by 20 percent for the months of January, Febuary, March, April, May, June, November and December. It was assumed that this would bring about an increase in consumption (KWH) during these months of 5 percent.

Effective rates were increased 40 percent for the billing months of July, August, September and October, and it was assumed that this would reduce consumption (KWH) during these months by 15 percent.

If these assumptions were correct, then the total revenue generated by these changes would essentially be the same as actual revenue for that year.

Obviously, these are assumptions. Nevertheless, there would be some response; and additional research into this area would produce an optimum price for stabilizing consumption.

Beyond this, there is a further problem which deserves research. The response discussed above is in terms of KWH, not demand. The relevant question is the relationship of response in terms of energy to response in terms of peak demand. There would be some, and this response could be increased if a good public relation of educational program was used in conjunction with flexible rate structures. Flexible rate structures are defined as summer, winter variations as well as time of day pricing. With regard to pricing, the municipalities

TABLE III

RESIDENTIAL ELECTRICITY CONSUMPTION (KWH) FOR 1974
FOR A CITY OF 5,000 (Actual)

Month	Consumption - KWH	Charge	Price Per KWH
January	1,106,364	$ 25,408.11	2.29654
February	1,506,765	32,146.20	2.13345
March	1,114,509	25,576.60	2.29487
April	1,135,658	25,892.43	2.27994
May	1,188,211	26,805.35	2.25594
June	1,128,079	25,759.48	2.28348
July	1,612,911	33,876.56	2.10033
August	1,745,705	36,047.50	2.06492
September	1,692,265	37,161.74	2.19597
October	1,895,081	41,041.31	2.16567
November	1,303,388	30,974.09	2.37642
December	1,204,706	29,650.75	2.46124
Total	16,633,642	370,340.12	

These billing months reflect consumption for the previous month.

TABLE IV

HYPOTEHTICAL RESIDENTIAL ELECTRICITY CONSUMPTION (KWH)[1]
FOR A CITY OF 5,000

Month	Consumption - KWH	Charge	Price per KWH
January	1,161,682	$ 21,342.79	1.837232
February	1,582,103	27,002.70	1.70676
March	1,170,234	21,484.28	1.835896
April	1,192,441	21,749.55	1.823952
May	1,247,622	22,516.48	1.804752
June	1,814,483	21,637.95	1.826784
July	1,370,974	40,312.97	2.940462
August	1,483,849	42,896.41	2.890888
September	1,438,425	44,222.33	3.074358
October	1,610,819	48,839.03	3.031938
November	1,368,557	26,018.13	1.901136
December	1,264,941	24,906.59	1.968992
Total	16,076,130	362,929.21	

[1]To calculate this hypothetical situation, the rates for the months of January, February, March, April, May, June, November and December, 1974 were reduced by 20 percent. The consumption for these same months was increased by 5 percent. The rates for the month of July, August, September and October, 1974 were increased by 40 percent and the consumption was reduced by 15.percent.

are legally free to price electricity as they see fit. The only limitation is that presented from a political standpoint.

It may be that a municipality would have even more flexibility in terms of accepting a lower level of revenue if it could save on demand costs. If it is assumed that the previously mentioned 15 percent reduction in KWH would also mean a reduction of 15 percent in demand costs, this particular city could save approximately $50,000 which would mean that it could accept a lower total revenue which obviously means the customers would save $50,000.

V. SUMMARY OF RECOMMENDED APPROACH

The substate program design recommends that a detailed analysis or complete energy audit or analysis be performed in each municipality. (Georgia Power and the EMC's should do the same, but the municipalities offer the more immediate opportunity). This analysis would include, but not be limited to:

(1) Analysis of historical trends in energy and peak demand for electricity including change in number and type of customers, as well as actual energy consumed.

(2) Consideration of the type customers, not only whether they are residential, commercial, industrial or institutional (but also the individual customers, if heavy consumers) that, is seasonal demand, continuous demand, etc. The objective being to isolate or identify specific individuals or goups contributing to the problem.

(3) Consideration would also simultaniously have to be given to other energy sources.

(4) Identify industrial, commercial or institutional users who could use electricity to supplement other energy sources such as natural gas.

(5) Evaluate possibility of a rate structure that would effectively discourage summer use of electricity and encourage winter use of electricity to include time-of-day pricing. This would require some previous

basic research in demand elasticity or, else, be accomplished as a part of this study. This would reduce energy consumption and, through this, control the peak to some extent.

(6) Give additional consideration and evaluation of cost involved in demand meters for every customer.

(7) Promote additional technical research by outside sources.

(8) Based on the findings of this detailed analysis, formulate and establish facilitative policies which help alleviate problems.

NATURAL GAS

I. DEMAND

Natural gas in the substate area is provided to the final consumer by two types of sources - Municipalities and South Georgia Natural Gas in Thomasville.

1. The following municipalities purchase natural gas from South Georgia Natural Gas Company and retails gas to the individual customers.

Albany, Georgia	Donalsonville, Georgia
Bainbridge, Georgia	Edison, Georgia
Blakely, Georgia	Meigs, Georgia
Cairo, Georgia	Moultrie, Georgia
Camilla, Georgia	Pelham, Georgia
Colquitt, Georgia	Sylvester, Georgia
Dawson, Georgia	Thomasville, Georgia
Doerun, Georgia	Decatur County, Georgia

The remaining municipalities in the Southwest Georgia APDC do not have natural gas.

2. The following industrial customers purchase natural gas directly from South Georgia Natural Gas Company.

Merck and Company, Albany, Georgia
Engelhard Minerals & Chemicals Corp., Attapulgus, Georgia
Waverly Mineral Products, Meigs, Georgia
Oil Dri Corporation, Ochlocknee, Georgia
Milwhite Company, Attapulgus, Georgia
Great Southern Company, Cedar Springs, Georgia

As was the case with electrical energy, certain basic data is necessary for energy planning; and previous, current and projected consumption is certainly one of the required data areas.

MUNICIPALITIES

Each of the 16 municipalities receive their gas from South Georgia on a daily allotment basis.

The daily allotments for each of the municipalities are shown in Table V. Also, the daily allotments are expanded to show the maximum annual consumption allowed (365 days x daily allotments). The third column shows actual consumption for these municipalities for the 12 month period of April, 1974 through March, 1975.

TABLE V.

DAILY NATURAL GAS ALLOTMENTS AND CONSUMPTION
IN MUNICIPALITIES IN SOUTHWEST GEORGIA

Municipality	Daily Allotment (MCF)	Annual Consumption Allowed (MMCF)	Actually Consumed (MMCF)
Albany	12,000	4,380	4,570
Bainbridge	2,528	923	513
Blakely	898	328	102
Cairo	1,700	621	206
Camilla	1,130	413	122
Colquitt	398	145	N/A
Dawson	1,200	438	154
Decatur County	343	125	N/A
Doerun	208	76	N/A
Donalsonville	497	181	N/A
Edison	265	97	N/A
Meigs	242	88	121
Moultrie	3,500	1,277	748
Pelham	925	338	N/A
Sylvester	750	274	N/A
Thomasville	3,500	1,278	896

SOURCE: South Georgia Natural Gas Company

The above figures reflect daily allotments and consumption for one year only. Consequently, the following additional information relating to consumption and demand should be obtained.

(1) Daily allotments for the municipalities for the previous 10-year period to ascertain changes in trends regarding daily allotments.

(2) Derive the total amount of gas available on an annual basis for these municipalities for the previous ten-year period.

(3) Total consumption data on an annual basis (for the municipalities) for the same ten-year period.

(4) Compare availability and consumption data for the previous years.

(5) In addition to total consumption data on an annual basis, data are needed which will reflect consumption by type of customers, ie. residential, commercial, industrial, etc. (also over a ten-year period).

The above five types of data would illustrate several points.

First, long term trend lines could be established which would show the changes in natural gas consumption over the years and which could be used in making demand projections assuming that natural gas was not in short supply. Obviously, this type data could also be related to various economic indicators (natural gas consumption versus growth, etc. could be correlated).

It would also point out the relative importance of the various types of customers. (It is known that the majority of natural gas is used by industrial customers. However, the precise extent is not known in the substate area. This knowledge would assist in identifying possible management practices).

In short, additional data is needed with regard to previous consumption patterns in order that this consumption/demand and projections can successfully be related to various economic indicators.

Furthermore, it is common knowledge that there exists a "peaking" problem with regard to natural gas essentially of the same nature as electricity. This peaking of natural gas is a "winter" problem as compared with the peaking of electricity which is a "summer" problem. There are some rather significant differences between the two, however, in terms of causes, effects and possible

solutions.

While additional information is needed with regard to this peaking, Charts XI - XIX vividly illustrate at least part of the problem. For example, Chart XI shows that Camilla has a daily allotment of 1,130,000 cubic feet.

However, on an average daily delivery basis (average for each month) the highest point reached was 660,000 cubic feet which is significantly below the daily allotment of 1,130,000 cubic feet. This however, does not take the analysis far enough. On any given day in December (which was the peak monthly average in Camilla), the peak could have reached or exceeded the daily allotment.

Consequently, additional data on a daily basis is needed to properly evaluate the scope and extent of the problem.

A limited amount of information relating to daily consumption was obtained for five of the sixteen municipalities retailing natural gas. In most cases, the data reflects two to three-year periods and includes the municipalities of Moultrie, Sylvester, Camilla, Blakely, and Pelham (See Tables VI through X).

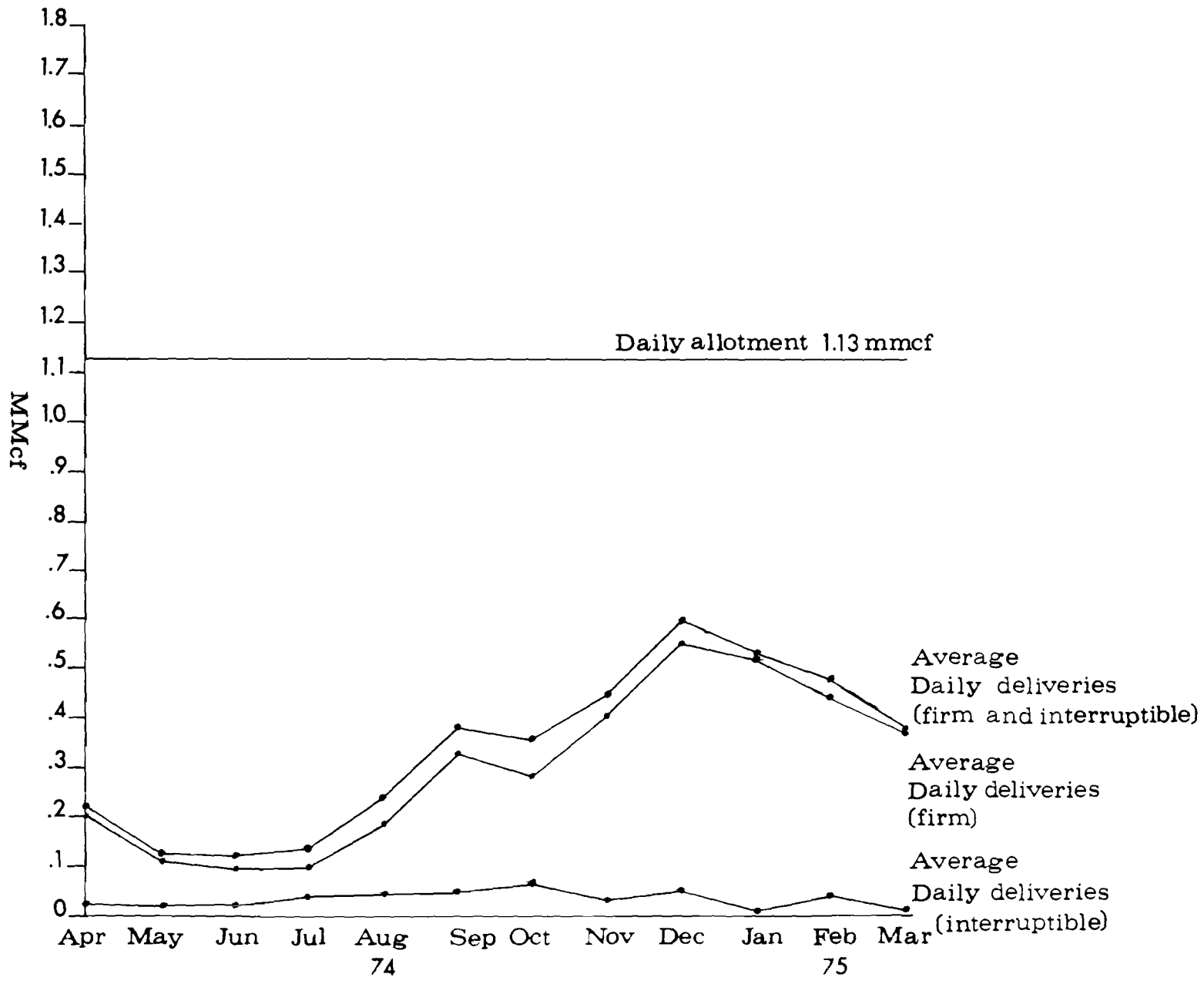
In the case of Camilla, the Camilla, the period considered was from March, 1972, to May, 1975. The daily allotment of 1130 MCF was exceeded only four times. In addition, there were only eleven other days during this period when the daily consumption reached the 1,000 MCF level. On the remaining days the margin of safety was considerable.

In the case of Blakely, a period of time from January, 1973, to October, 1975, was involved. During this period consumption did not exceed allotment on a single day.

Obviously, municipalities are aware of this problem and would like some way to correct it, since in most cases, they would like to sell additional gas in the summer to generate more revenue. For example, Camilla could theoretically receive 413 MMCF on an annual basis. Yet it only used 122 MMCF. The difference (291 MMCF) represents, in one sense of the word, a lost resource and lost revenue for the City which means higher taxes and higher natural gas rates to operate the

Chart XI. Natural Gas Data

Camilla, Georgia
Apr 74-Mar 75



Annual Amount Deliver

Total	122 mr
Firm	109 mr
Interruptible	13 mr

Allocation
412 mmcf

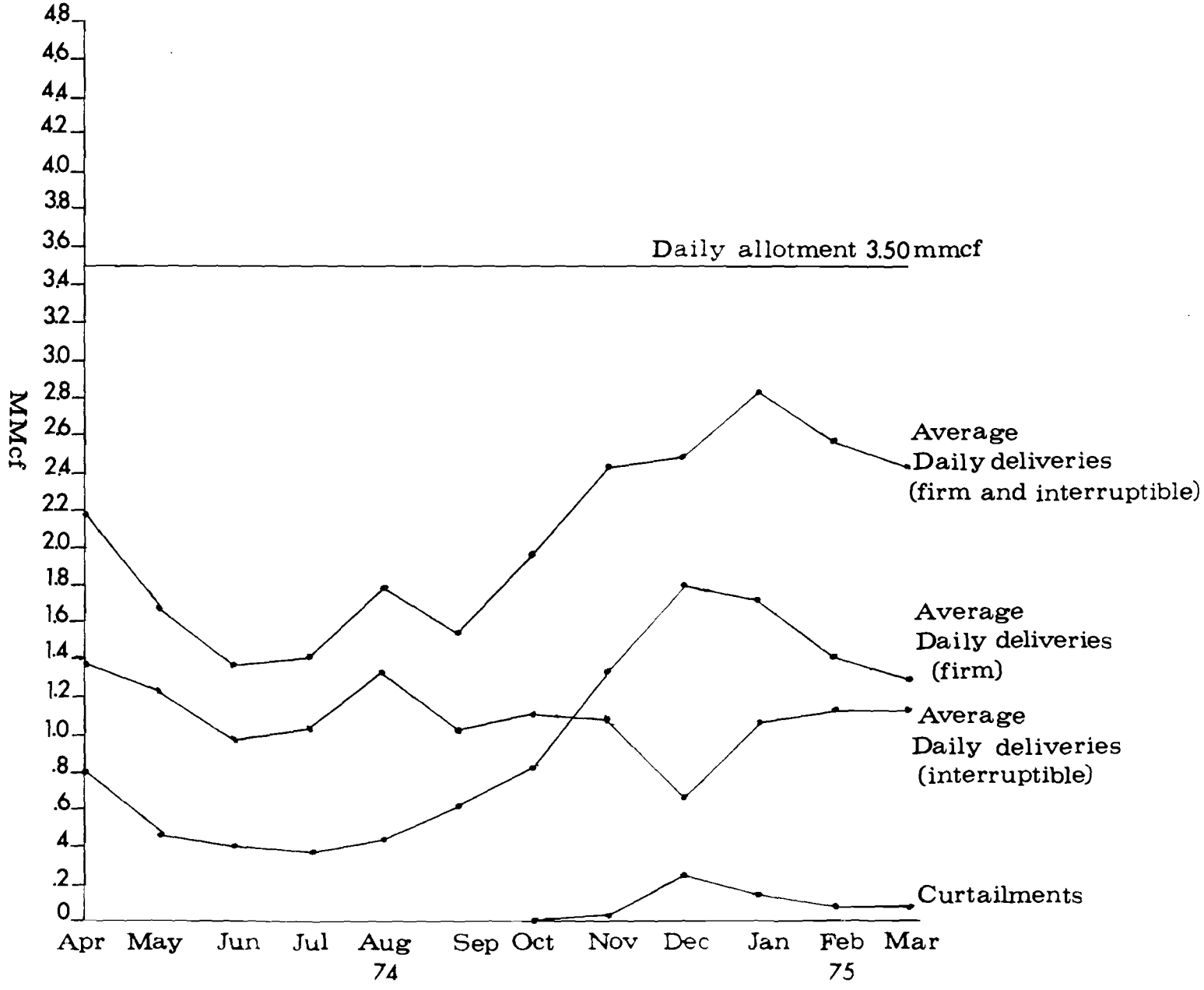
Peak Day

Firm	.66 mr
Interruptible	mn
Total	.66 mr

Curtailment
none

Chart XII. Natural Gas Data

Moultrie, Georgia
Apr 74-Mar 75

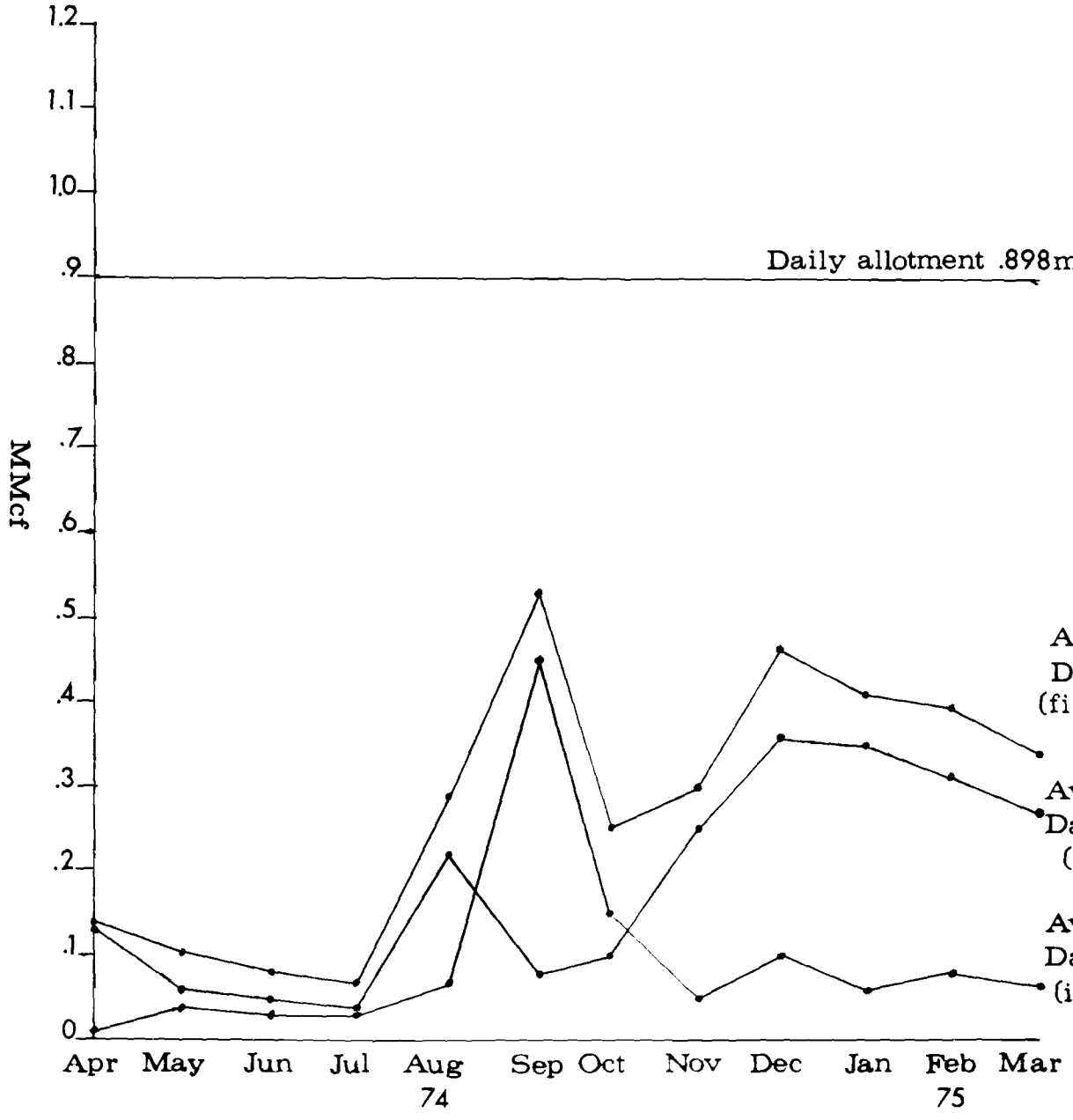


Annual Amount Deliver	
Firm	349 mn
Interruptible	399 mn
Total	748 mn

Allocation
1,278 mmcf

Peak Day	
Firm	2.30 mn
Interruptible	.45 mn
Total	2.75 mn

Chart XIII. Natural Gas Data
Blakely, Georgia
Apr 74-Mar 75



Average Daily deliveries (firm and interruptible)

Average Daily deliveries (firm)

Average Daily deliveries (interruptible)

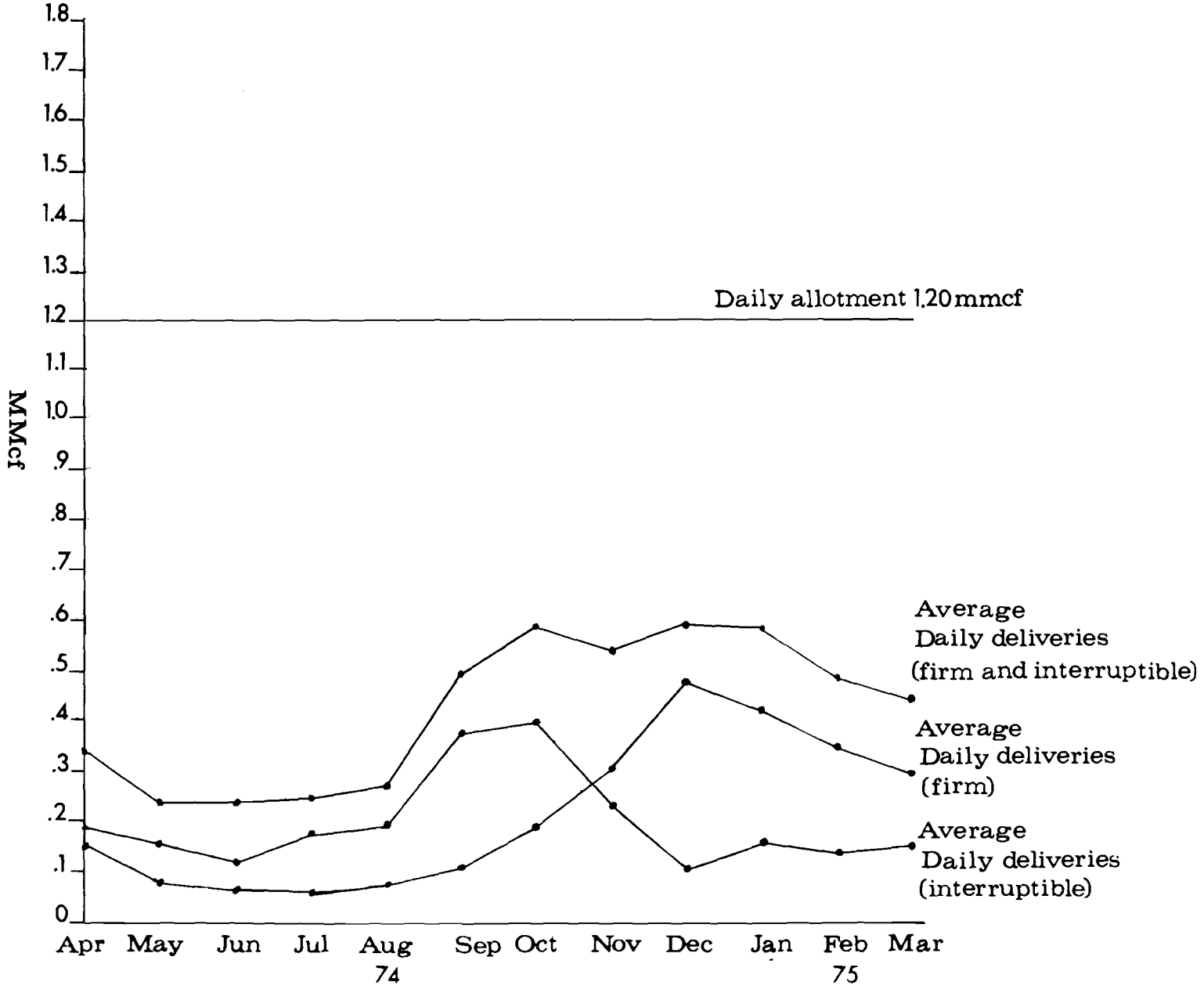
Annual Amount Delivei
Firm 68 mi
Interruptible 34 mi
Total 102 mi

Allocation
327mmcf

Peak Day
Firm .45 mi
Interruptible .09 mi
Total .54 mi

Curtailments
none

Chart XIV. Natural Gas Data
Dawson, Georgia
Apr 74-Mar 75



Annual Amount Deliver

Firm	80mm
Interruptible	74 mm
Total	154 mm

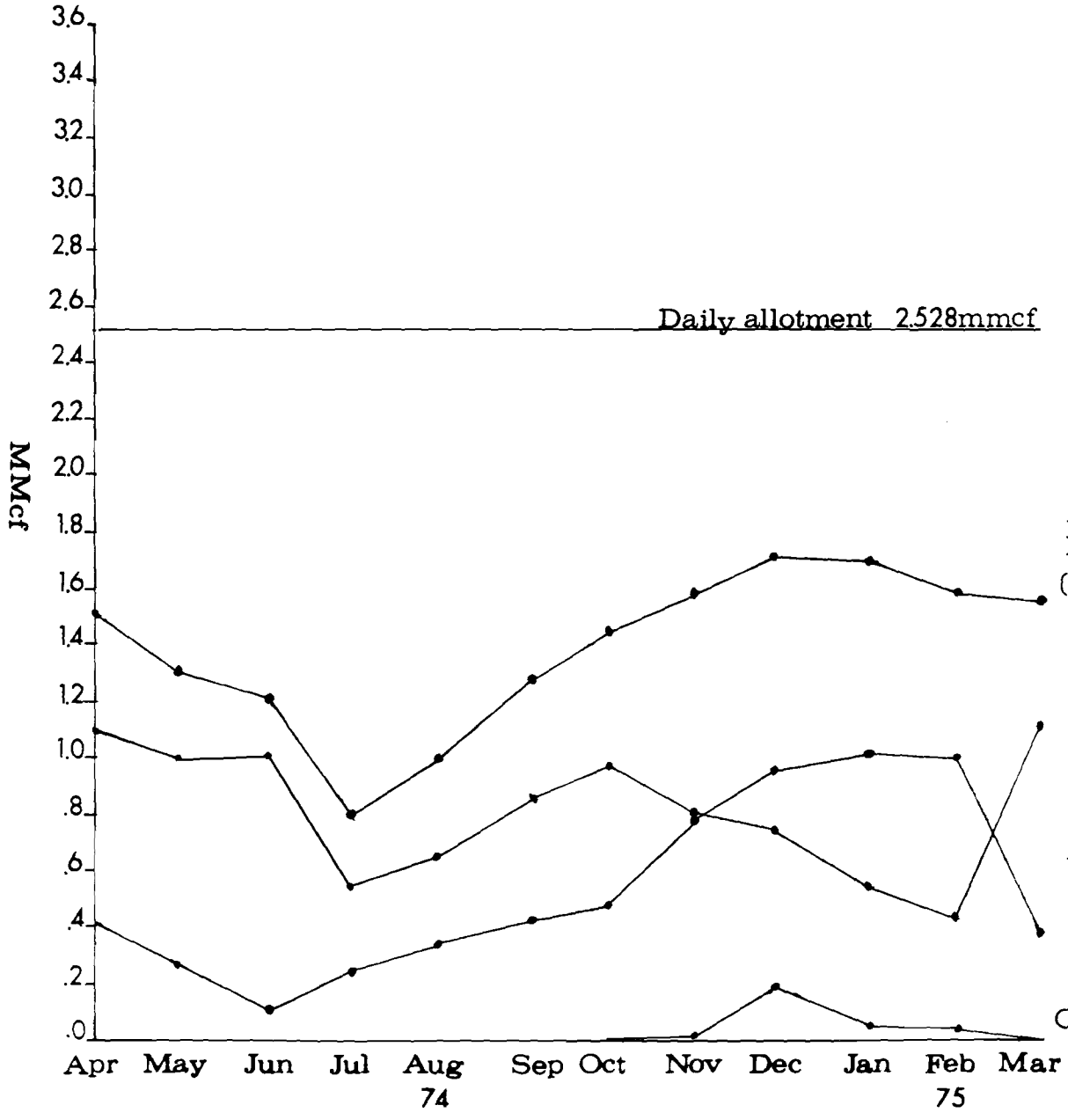
Allocation
438 mmcf

Peak Day

Firm	.53 mm
Interruptible	.04 mm
Total	.57 mm

Curtailments
none

Chart XV. **Natural Gas Data**
Bainbridge, Georgia
Apr 74-Mar 75



Average Daily deliveries (firm and interruptible)

Average Daily deliveries (Interruptible)

Average Daily deliveries (firm)

Curtailments

Annual Amount Deliver	
Total	513 mn
Firm	208 mn
Interruptible	305 mn

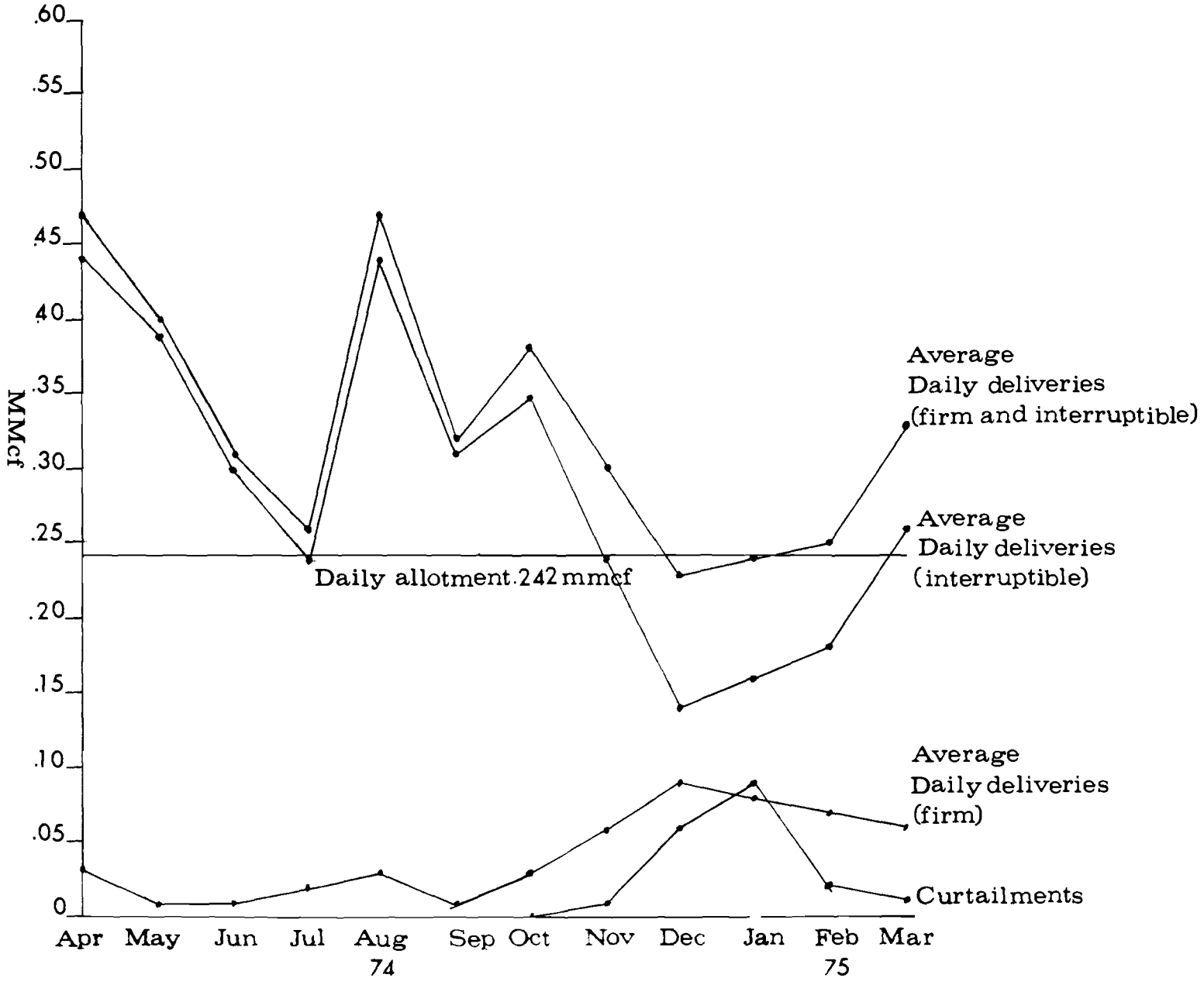
Allocation
920 mmcf

Peak Day	
Firm	1.80 mn
Interruptible	.35 mn
Total	2.15 mn

Chart XVI. Natural Gas Data

Meigs, Georgia

Apr 74-Mar 75



Annual Amount Deliveri

Firm	16 mm
Interruptible	105 mm
Total	121 mm

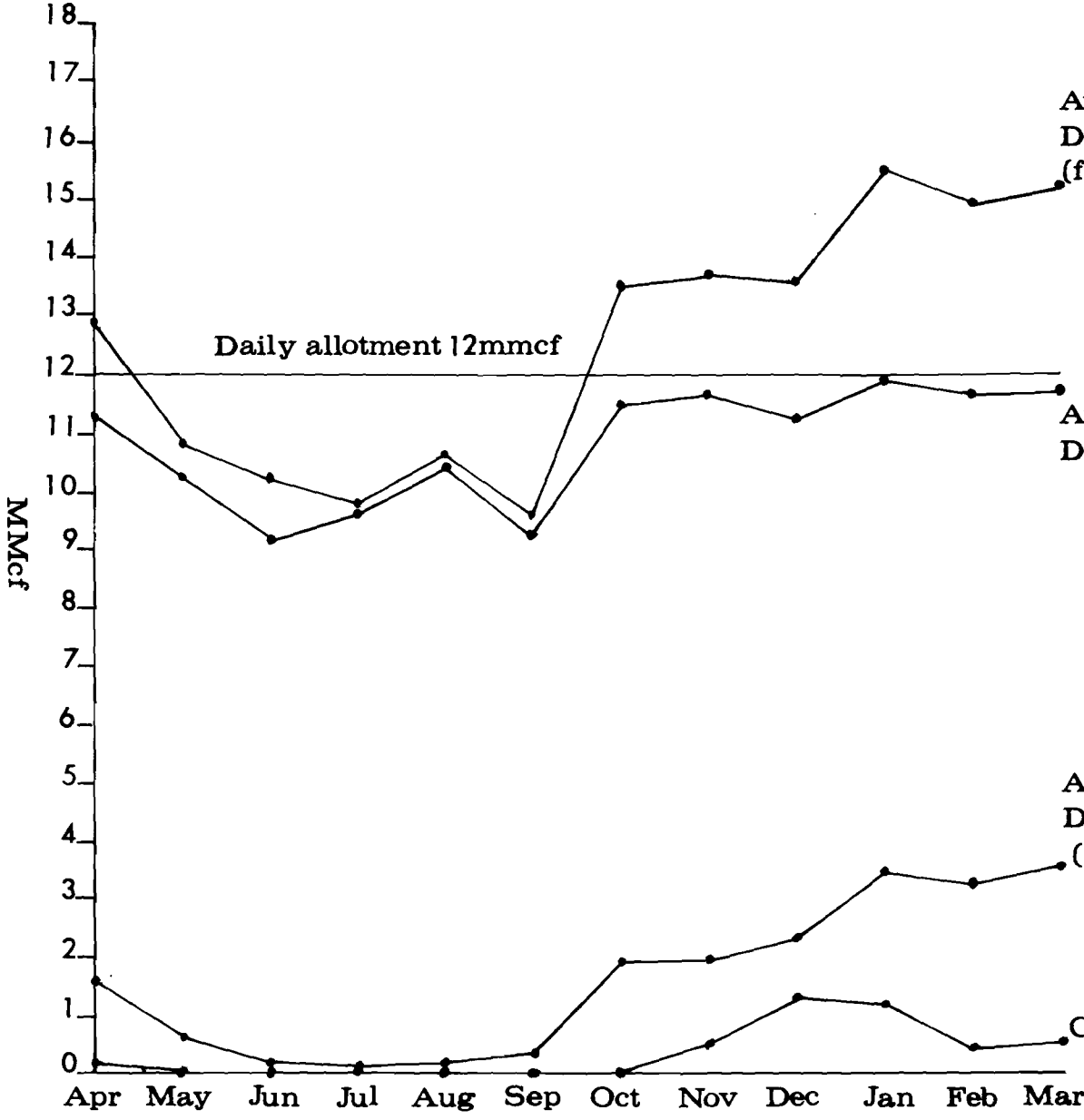
Allocation

88 mmcf

Peak Day

Firm	.14 mm
Interruptible	mm
Total	.14 mm

XVII. Natural Gas Data
Albany, Georgia
Apr 74-Mar 75



Annual Amount Deliveries

Total	4,570 mmcf
Firm	3,970 mmcf
Interruptible	600 mmcf

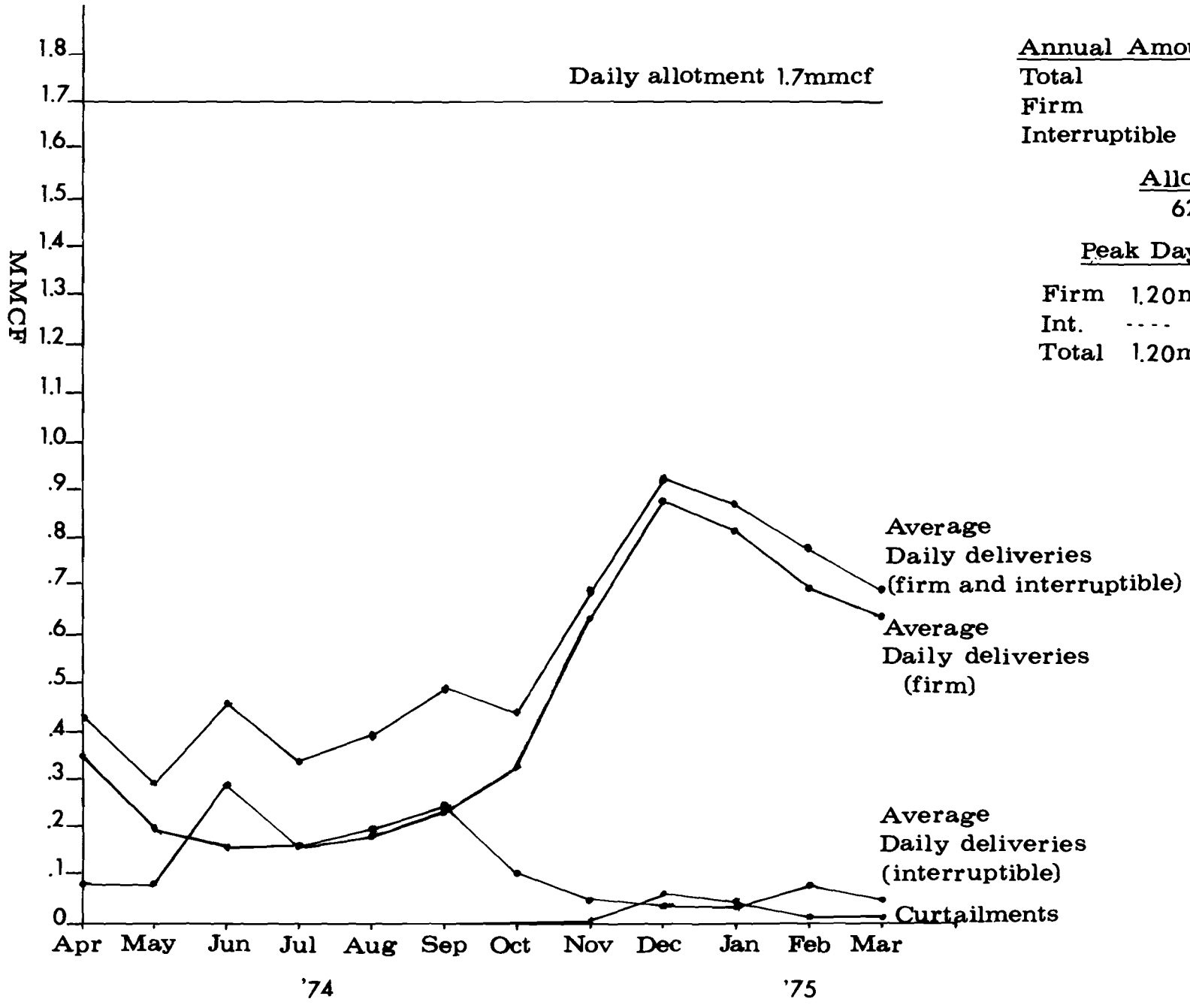
Allocation

4,380 mmcf

Peak Day

Firm	12.02 mmcf
Int.	5.30 mmcf
Total	17.32 mmcf

Chart XVIII. Natural Gas Data
Cairo, Georgia
Apr 74 - Mar 75



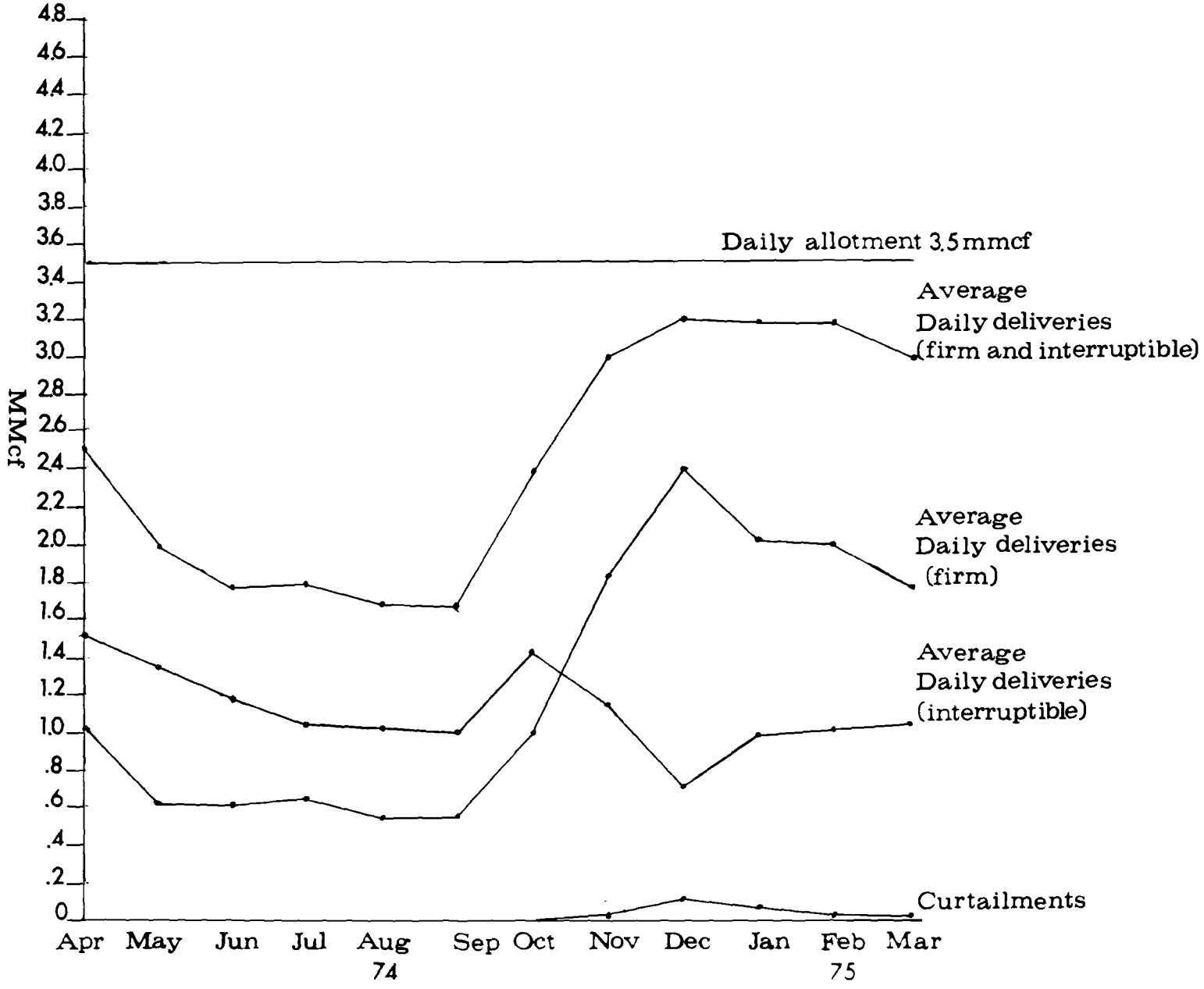
Annual Amount Deliveries	
Total	206 mmcf
Firm	162 mmcf
Interruptible	44 mmcf

Allocation
621mmcf

Peak Day

Firm	1.20mmcf
Int.	----
Total	1.20mmcf

Chart XIX. Natural Gas Data
Thomasville Georgia
Apr 74-Mar 75



Annual Amount Deliver

Total	896mr
Firm	468mr
Interruptible	428mr

Allocation
1,278 mmcf

Peak Day

Firm	3.10mr
Interruptible	1.20mr
Total	4.30 mr

Moultrie, Georgia (Daily Allotment 3500 MCF)

Days	Jan 73	Feb 73	Mar 73	Oct 73	Nov 73	Dec 73	Jan 74	Feb 74	Mar 74	Oct 74	Nov 74	Dec 74
1	1,565	3,082	3,794	1,877	2,577	1,873	1,329	2,764	3,009	2,011	2,079	3,127
2	3,311	3,039	2,948	1,760	1,409	1,609	2,547	968	1,493	2,025	1,044	2,800
3	2,189	2,753	1,115	1,789	730	2,706	2,667	1,122	1,506	2,538	763	2,796
4	1,194	2,667	1,090	2,069	744	2,522	2,187	4,436	2,783	2,235	2,396	3,153
5	1,418	3,859	2,704	1,784	2,274	3,619	1,126	4,325	2,794	1,090	2,349	4,227
6	1,486	3,699	2,558	686	3,104	2,985	1,071	3,236	2,653	904	2,909	3,386
7	2,400	3,323	2,676	780	2,773	2,321	2,971	2,864	2,441	2,192	3,161	1,838
8	3,659	2,884	2,267	1,769	2,114	2,406	3,321	3,186	2,402	2,038	2,652	2,334
9	3,205	3,096	2,052	1,803	2,086	2,496	2,930	2,814	848	2,156	1,631	2,815
10	3.294	3,194	972	2,045	2,265	3,390	2,751	2,850	810	2,187	1,260	2,944
11	3,122	3,400	942	1,943	2,246	2,895	2,356	4,172	2,320	1,629	2,681	3,671
12	3,296	3,657	2,592	1,579	3,618	3,745	2,711	4,278	2,552	838	3,792	3,556
13	3,194	2,413	2,298	715	2,907	3,401	2,424	3,571	3,076	785	2,611	3,008
14	2,980	3,435	2,236	862	2,727	3,368	3,466	2,794	3,494	2,094	2,689	2,031
15	3,554	4,015	2,240	2,000	2,497	2,531	3,032	2,235	2,455	2,059	3,384	2,561
16	3,732	3,392	1,681	1,847	2,334	2,354	2,949	1,451	998	2,279	1,781	4,071
17	2,100	2,989	1,757	1,987	1,704	3,137	3,160	2,027	2,018	2,386	1,111	2,985
18	2,828	2,741	1,935	2,429	1,109	5,127	2,727	3,313	3,140	1,979	2,479	2,937
19	3,120	3,997	2,879	1,995	2,651	4,376	1,826	3,352	2,797	1,058	2,356	2,827
20	2,245	4,454	3,315	840	2,427	5,112	1,752	3,692	2,483	1,245	2,767	2,488
21	1,811	3,079	3,561	612	2,392	3,050	2,870	3,058	2,673	2,940	3,752	1,920
22	3,092	2,580	2,388	1,884	823	2,931	2,974	3,049	3,242	2,741	2,993	2,042
23	2,196	3,272	2,457	2,354	1,330	2,930	2,916	2,349	1,262	2,810	1,828	2,324
24	2,254	2,072	1,601	2,354	674	2,285	2,606	2,171	957	2,769	1,301	1,383
25	3,547	1,983	1,395	2,775	794	1,761	2,630	3,230	4,094	2,275	2,805	658
26	3,030	3,573	3,504	2,040	2,313	2,086	1,133	3,214	4,389	1,173	3,841	1,915
27	2,082	3,567	3,261	971	2,481	2,554	1,128	2,744	3,123	897	3,676	1,741
28	2,247	4,157	2,720	1,023	2,891	2,952	2,382	3,330	2,602	2,038	2,145	804
29	3,174		2,848	3,299	3,345	1,467	2,580		2,079	2,385	2,564	663
30	2,995		2,469	3,356	3,442	895	2,709		887	2,271	1,875	1,673
31	2,642		833	2,567		1,667	2,778		981	2,264		1,704

TABLE VII

DAILY DELIVERIES OF NATURAL GAS DURING SELECTED MONTHS

Sylvester, Georgia (Daily Allotment 750 MCF)

Days	Oct 73	Nov 73	Dec 73	Jan 74	Feb 74	Mar 74	Oct 74	Nov 74	Dec 74	Jan 75	Feb 75	Mar 75
1	165	368	370	249	206	320	286	226	827	294	119	230
2	165	196	240	301	100	215	296	136	806	596	193	671
3	145	143	281	281	230	249	255	123	701	332	703	470
4	167	130	203	234	654	240	337	183	757	522	702	631
5	125	193	377	234	554	177	202	180	735	603	434	519
6	94	290	565	160	361	176	113	340	472	600	459	426
7	53	177	508	449	250	203	209	372	385	422	635	275
8	155	116	545	394	671	151	208	391	588	477	623	502
9	136	222	535	254	724	82	166	334	754	186	489	541
10	158	479	721	245	679	81	167	264	649	160	548	237
11	166	476	785	230	610	145	167	240	460	180	306	154
12	158	385	615	476	635	178	117	452	387	338	274	174
13	83	300	364	389	443	300	153	480	473	872	446	136
14	83	271	469	581	290	356	201	350	417	766	381	457
15	146	210	367	351	230	266	197	593	481	715	235	306
16	167	312	767	331	327	228	220	346	614	552	222	452
17	191	317	938	306	369	439	260	175	826	537	213	319
18	263	206	815	260	502	336	251	193	728	340	172	496
19	200	233	679	264	453	196	208	147	494	323	273	414
20	146	178	701	195	485	183	248	313	352	734	427	288
21	145	277	981	309	347	312	453	475	459	613	350	199
22	168	136	902	260	596	426	417	421	522	674	199	118
23	210	172	587	250	451	180	377	297	350	611	152	100
24	210	144	382	222	396	192	369	212	126	376	656	157
25	210	103	215	170	953	748	283	558	134	311	527	259
26	168	168	228	111	803	626	209	683	366	399	382	391
27	105	166	419	125	659	336	228	583	236	309	378	261
28	156	389	473	159	489	210	240	519	159	302	328	150
29	498	619	191	166		166	239	489	99	219		66
30	436	438	177	170		116	223	418	133	200		276
31	359		234	269		82	249		232	173		375

TABLE VIII

DAILY DELIVERIES OF NATURAL GAS DURING SELECTED MONTHS

Camilla, Georgia (Daily Allotment 1130 MCF)

Days	Mar 72	Apr 72	May 72	Nov 72	Dec 72	Jan 73	Feb 73	Mar 73	Apr 73	May 73	Nov 73
1	333	554	234	360	882	313	528	484	363	331	523
2	377	497	220	329	666	723	538	370	418	303	251
3	692	486	231	319	502	546	816	259	404	356	165
4	446	426	229	247	367	393	799	248	477	412	136
5	757	367	210	298	361	446	683	340	489	401	320
6	979	334	156	427	370	503	480	303	449	336	452
7	528	295	161	437	416	832	467	326	408	268	317
8	642	252	213	554	260	1,144	535	312	240	155	314
9	846	377	201	639	180	1,088	1,122	314	472	260	426
10	602	289	211	416	270	1,080	1,239	316	693	207	541
11	493	188	253	283	358	1,046	965	179	691	152	675
12	416	208	207	203	418	1,095	1,047	249	472	152	755
13	379	264	265	312	320	1,046	673	306	368	104	505
14	321	210	269	446	350	704	592	264	368	307	404
15	295	183	309	538	531	728	777	303	289	256	313
16	393	184	310	666	905	732	963	306	287	256	389
17	499	274	278	708	1,008	524	990	573	285	307	370
18	341	226	297	553	929	465	718	466	287	307	320
19	313	241	271	398	696	525	853	407	311	307	424
20	311	222	211	762	522	583	805	526	259	272	328
21	277	198	208	663	574	433	782	682	207	326	374
22	377	125	315	734	536	650	794	528	126	230	225
23	323	131	312	727	678	589	763	372	294	214	354
24	345	221	284	801	512	703	582	370	261	189	280
25	409	280	308	489	624	647	505	271	261	184	242
26	463	240	276	700	827	563	614	414	341	112	339
27	400	221	190	812	841	654	532	314	444	133	198
28	374	156	175	632	688	683	519	475	407	166	400
29	376	148	187	711	515	1,184		422	278	202	726
30	590	129	268	829	280	983		418	318	305	607
31	729		291		308	796		422		305	

TABLE VIII
DAILY DELIVERIES OF NATURAL GAS DURING SELECTED MONTHS
Camilla, Georgia (Daily Allotment 1130 MCF) Contd.

Dec 73	Jan 74	Feb 74	Mar 74	Apr 74	May 74	Nov 74	Dec 74	Jan 75	Feb 75	Mar 75	May 75
435	381	177	344	134	128	192	914	295	175	342	166
267	337	145	258	157	133	171	965	688	219	621	110
368	278	222	234	134	119	131	897	324	754	920	102
361	189	701	223	150	102	191	856	642	787	930	107
513	194	572	213	263	91	206	852	600	475	662	181
705	179	286	164	334	159	410	558	674	495	482	126
785	317	211	188	342	148	560	558	487	834	267	121
694	340	690	162	343	130	549	765	417	664	512	141
769	248	812	117	556	130	526	925	206	564	633	141
934	169	773	121	513	111	483	852	206	711	324	96
1,000	209	747	131	309	116	327	648	259	318	460	100
754	396	649	164	243	148	650	512	330	362	443	240
528	570	510	346	220	221	611	642	1,133	497	460	237
586	455	319	423	133	207	439	613	1,050	432	490	241
398	278	290	335	180	206	612	693	918	350	386	223
926	319	289	266	219	233	402	843	626	313	418	210
1,083	409	513	433	224	185	251	910	552	338	370	179
990	368	447	310	261	196	226	901	466	312	550	187
673	374	318	197	174	87	210	470	476	540	424	249
723	343	399	141	129	111	466	508	995	642	310	141
1,092	358	288	271	127	110	535	513	916	443	284	161
917	361	418	371	134	105	523	502	680	264	155	214
721	311	514	215	146	115	426	360	676	157	133	216
396	297	561	204	179	100	367	195	342	858	266	173
207	207	1,021	644	212	85	844	174	402	592	280	187
298	148	1,059	600	186	88	848	448	503	432	333	244
436	119	782	309	123	104	679	365	503	489	280	256
505	159	465	188	122	113	632	306	328	346	191	241
237	132		156	146	106	594	262	231		123	256
219	181		142	122	101	534	322	212		267	241
284	212		151		101		315	197		482	219

TABLE IX
DAILY DELIVERIES OF NATURAL GAS DURING SELECTED MONTHS
Blakely, Georgia (Daily Allotment 898 MCF)

Days	Jan 73	Feb 73	Mar 73	Apr 73	Oct 73	Nov 73	Dec 73	Jan 74	Feb 74	Mar 74	Apr 74	Oct 74	Nov 74	Dec 74	Jan 75	Feb 75	Mar 75	Apr 75	Oct 75
1	434	321	298	99	376	323	226	218	116	211	131	772	202	665	279	162	293	258	136
2	523	369	216	88	178	180	208	215	116	134	96	663	164	731	503	204	[illegible]	186	144
3	455	484	97	226	537	116	196	192	116	95	104	591	107	718	409	613	[illegible]	397	542
4	237	463	145	224	450	89	155	184	474	189	125	553	131	587	486	676	[illegible]	397	701
5	282	385	177	343	446	252	229	146	390	[illegible]	179	288	136	572	488	494	[illegible]	298	197
6	312	246	89	238	257	224	396	159	249	89	235	133	216	499	504	478	[illegible]	298	133
7	512	248	163	238	185	255	426	318	178	91	152	219	293	389	438	748	[illegible]	281	181
8	835	325	89	128	309	82	365	260	530	120	265	197	250	518	421	540	[illegible]	235	116
9	794	780	89	326	322	185	409	112	459	38	332	167	237	692	177	518	[illegible]	151	158
10	876	771	147	362	247	360	662	90	415	40	284	187	207	636	202	540	[illegible]	205	380
11	786	709	52	346	232	342	529	134	523	85	149	135	282	514	218	313	[illegible]	236	447
12	843	858	147	208	76	382	383	198	474	8[illegible]	119	84	425	451	385	263	[illegible]	251	256
13	721	563	110	154	76	225	231	314	289	176	57	112	401	537	716	374	[illegible]	259	316
14	650	328	44	127	33	206	275	439	193	248	125	173	346	456	655	337	[illegible]	414	319
15	627	495	107	118	182	148	261	239	109	136	203	139	477	493	522	227	[illegible]	257	320
16	556	658	74	117	150	214	557	181	152	125	225	204	319	601	408	278	[illegible]	288	366
17	479	663	376	87	200	237	816	221	257	244	205	249	218	729	368	186	[illegible]	199	236
18	284	559	225	88	192	194	661	129	379	274	176	152	191	663	331	206	[illegible]	114	153
19	361	560	267	81	162	287	478	123	230	163	67	197	141	516	323	308	[illegible]	137	175
20	391	496	234	51	143	141	503	105	269	99	67	220	243	438	661	423	[illegible]	145	284
21	338	496	371	73	65	228	710	143	191	172	83	386	329	339	562	316	[illegible]	242	259
22	359	562	354	48	163	74	565	144	308	265	151	360	332	339	563	236	[illegible]	178	264
23	438	352	156	89	217	74	429	129	368	127	137	329	218	377	488	209	[illegible]	198	196
24	477	335	245	90	200	110	296	86	278	105	151	320	136	179	430	575	[illegible]	132	168
25	477	337	157	92	204	36	109	128	714	[illegible]	160	302	508	212	397	474	[illegible]	90	81
26	397	305	273	130	112	90	183	81	707	[illegible]	93	150	537	389	335	399	[illegible]	29	110
27	321	314	213	289	93	120	220	82	495	359	111	149	536	273	334	352	[illegible]	77	144
28	507	380	200	174	164	235	357	126	374	173	68	187	459	112	258	284	[illegible]	47	178
29	886		200	127	430	408	147	113		8[illegible]	97	108	502	108	237		[illegible]	67	148
30	746		202	162	407	316	107	171		127	81	107	382	214	244		336	54	186
31	573		138		320		88	126		52		136		210	187		[illegible]		290

TABLE X

DAILY DELIVERIES OF NATURAL GAS DURING WINTER MONTHS
1972, 1973 and 1974
Pelham, Georgia (Daily Allotment 925 MCF)

Days	Dec 71	Jan 72	Feb 72	Mar 72	Oct 72	Nov 72	Dec 72	Jan 73	Feb 73	Mar 73	Oct 73	Nov 73	Dec 73	Jan 74	Feb 74	Mar 74	Oct 74	Nov 74	Dec
1	560	150	681	254	84	137	598	291	408	273	114	200	296	351	369	467	367	269	N/A
2	696	212	516	296	105	72	460	537	355	246	100	146	153	421	101	179	403	83	N/A
3	717	314	637	532	74	72	319	340	506	190	142	114	448	421	119	147	442	76	N/A
4	626	222	718	337	72	141	299	193	498	213	70	91	271	351	687	361	292	169	N/A
5	425	530	588	343	74	64	223	383	503	268	114	129	345	199	605	256	204	239	N/A
6	287	690	397	601	74	146	299	436	321	212	42	216	676	201	397	241	102	344	N/A
7	242	591	590	372	91	146	373	436	291	214	84	143	646	438	327	185	248	379	N/A
8	274	418	530	450	60	249	295	715	404	212	75	106	387	254	603	239	308	429	N/A
9	214	205	680	593	103	245	209	716	818	141	73	181	446	168	685	107	279	218	N/A
10	130	229	545	371	79	161	187	715	837	141	73	334	753	260	380	235	285	194	N/A
11	146	213	606	181	86	146	194	716	891	141	58	332	824	246	759	213	269	364	N/A
12	46	228	461	209	79	123	175	715	709	192	58	289	529	307	590	269	127	448	N/A
13	244	212	381	183	86	102	99	716	425	192	61	216	373	346	437	392	59	361	N/A
14	186	310	703	237	58	178	160	716	345	192	38	143	508	511	256	480	199	220	N/A
15	198	692	519	176	79	441	354	616	557	192	212	128	304	435	383	361	246	501	N/A
16	206	761	573	232	72	360	606	680	679	192	141	147	635	398	162	384	314	226	N/A
17	228	774	477	415	71	473	669	377	677	193	200	216	868	433	318	527	199	142	N/A
18	421	544	737	186	71	314	601	259	768	192	157	130	846	359	384	357	201	212	N/A
19	266	425	700	142	73	303	441	303	566	313	114	159	600	177	308	318	129	210	N/A
20	293	418	515	262	333	536	291	377	530	371	100	177	610	165	400	243	144	362	N/A
21	293	335	627	191	194	455	511	269	519	482	61	256	691	435	369	282	354	472	N/A
22	441	253	450	236	128	588	408	338	524	347	225	364	618	215	384	423	395	402	N/A
23	523	148	448	137	79	473	353	512	352	301	225	216	494	215	462	57	312	216	N/A
24	301	295	368	278	130	528	295	579	266	297	225	85	328	363	462	53	360	144	N/A
25	221	453	275	210	231	306	498	574	258	289	359	88	158	211	870	286	358	439	N/A
26	266	451	164	256	167	548	591	508	472	299	76	82	443	105	834	576	113	638	N/A
27	270	369	281	198	142	530	517	512	443	360	150	180	539	55	718	297	127	487	N/A
28	229	326	539	242	156	395	517	467	379	334	136	431	547	287	610	292	158	379	N/A
29	229	183	263	339	171	534	294	858		261	342	562	183	381		223	290	315	N/A
30	151	166		543	113	545	218	712		203	422	377	150	322		94	181	325	N/A
31	155	668			105		218	655		258	418		211	367		257	217		N/A

gas system as well as other government activities.

Not all the municipalities lose this much gas. Albany and Meigs utilize all of their allotments.

Some of the utility managers stated that they could not afford to pay the penalty for exceeding the peak even if the gas was available, unless there was more summer consumption. Consequently, many have a flat policy of not accepting any new customers. In many cases, they would, in fact, be willing to take on additional summer customers who would be willing to use alternate fuels in the winter. With additional summer customers it might also enable them to exceed winter allotments and pay the penalty, if the gas was available.

It appears that communities have too many firm contracts and too few interruptible contracts with heavy industrial users.

Also, while some of the towns have peak shavings, others do not and currently feel that the economics of peak shavings are poor (Perhaps research into the economics of this alternative would be desirable). This might even include joint peak shavings plants for two or more municipalities.

Additional information is needed with regard to natural gas data as well as the information regarding written or unwritten policies, procedures, contracts, etc., in the allocation program.

It does seem, however, that assuming suppliers are able to maintain present allocations and honor their contracts, the supply of natural gas in South Georgia could be managed in a way that would allow better utilization of this resource.

It also appears that firms which can use alternative fuels such as heating oil during the winter months may have to do so eventually, if the resources are to be allocated in the best interest of the area.

Consequently, detailed data are needed to ascertain which of the larger users could use alternate fuels. For example, some food processors cannot use fuel oil. Also, institutions may need to convert to LP gas, electricity, etc.

The past relative "cheapness" of natural gas has obviously been a prime motivating factor contributing to high usage. At the time of this writing, the cost of LP per BTU is almost four times that of natural gas. Changes in the relative cost of gas (if, for example, natural gas is decontrolled) will tend to lessen this demand, although there will always be a significant gap in price due to the nature of the products and marketing structures.

While changes in pricing at the national level probably would be helpful, the possibility also exists for some type of variable pricing on a seasonal and time-of-day basis at the local level to the ultimate customer (similar to that proposed for electricity) which would tend to reduce peak consumption. Again, while wholesale rates are controlled, municipalities are free to price natural gas at the level desired. The only restraint is that of consumer and political acceptability.

DIRECT CUSTOMERS

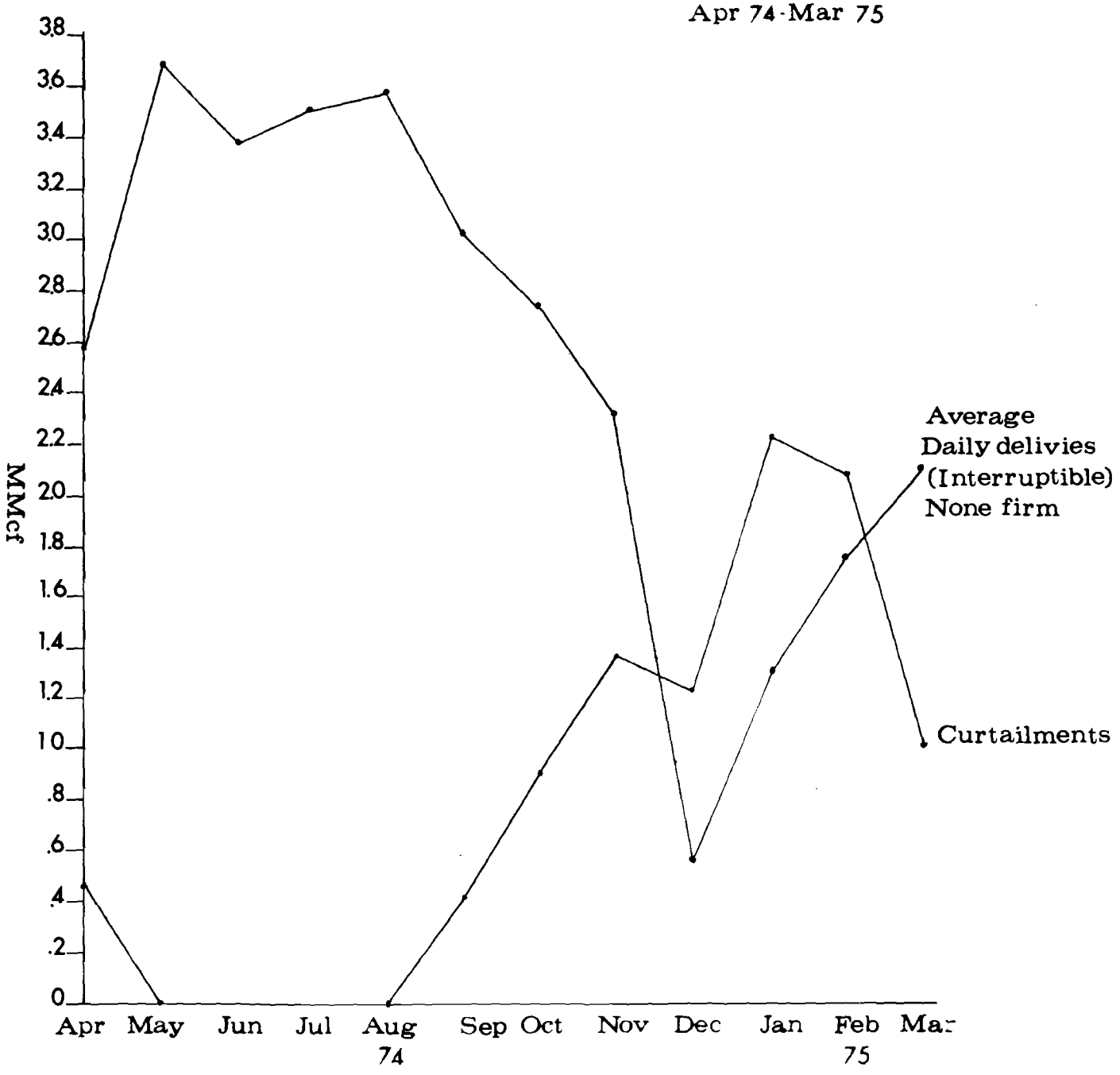
As stated previously, six large industrial users in the substate area obtain natural gas directly from South Georgia Natural Gas Company.

Chart XX through XXV show average daily deliveries to each of these customers (comparable to the data provided on municipalities).

There are some distinct differences, however, in delivery patterns. First of all, these customers are all interruptable customers. Secondly, average daily delivery data shows that the majority of the gas is consumed during the summer months or in non-peak periods. These firms either have alternative fuels for winter use and/or have arranged their production patterns in such a manner that the majority of the production is during the summer months.

Obviously, additional customers of this type are needed. It seems reasonable to assume that there are other existing customers (of the municipalities) which could also operate on this basis. In addition, new industrial customers of this type should be sought which would provide for the creation of new jobs and pre-

Chart XX. Natural Gas Data
Great Southern Company
Apr 74-Mar 75



Annual Amount Delive

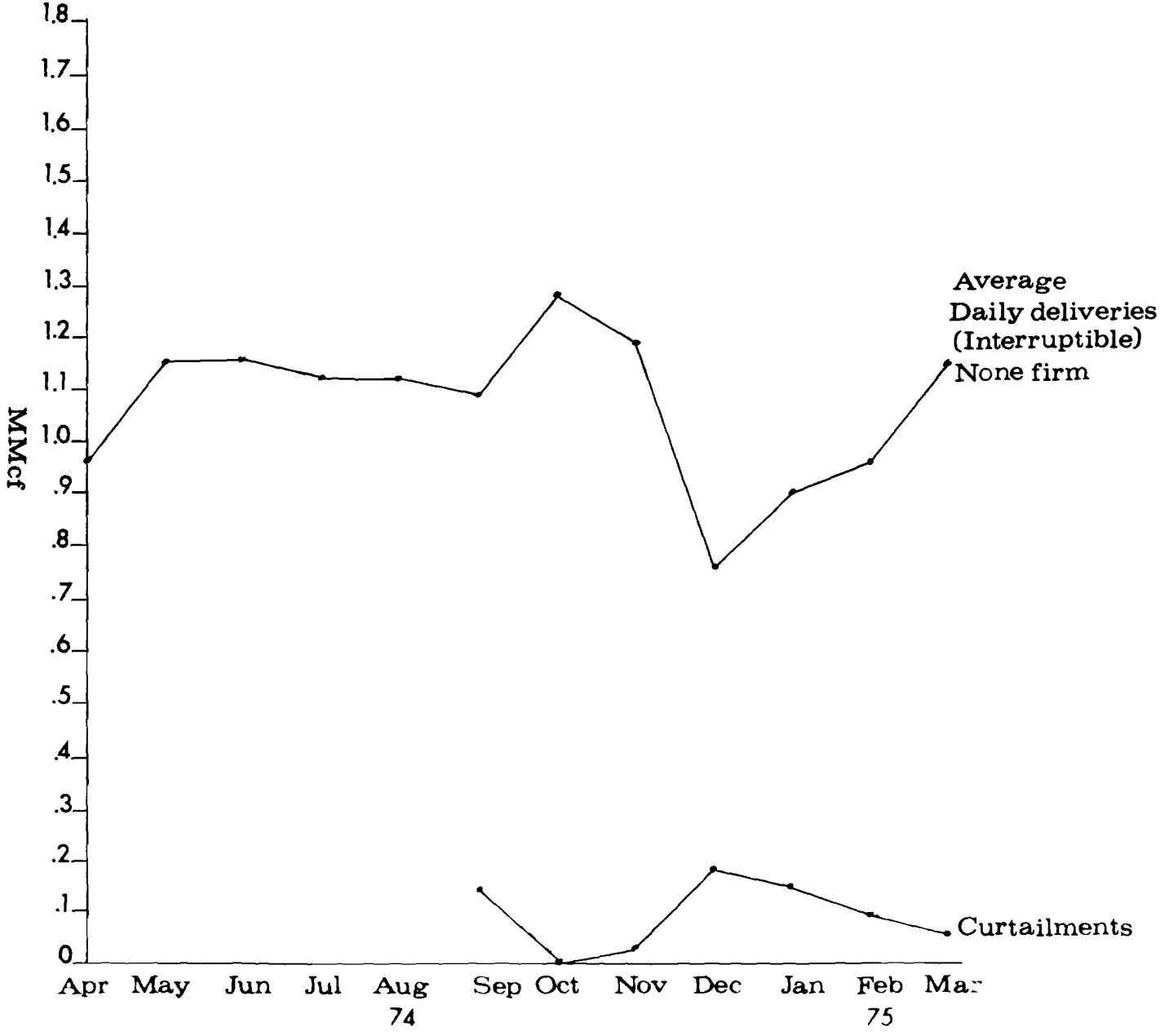
Total	928m
Firm	0m
Interruptible	928m

Peak Day

Firm	0m
Interruptible	3.50m
Total	3.50 m

Chart XXI. Natural Gas Data

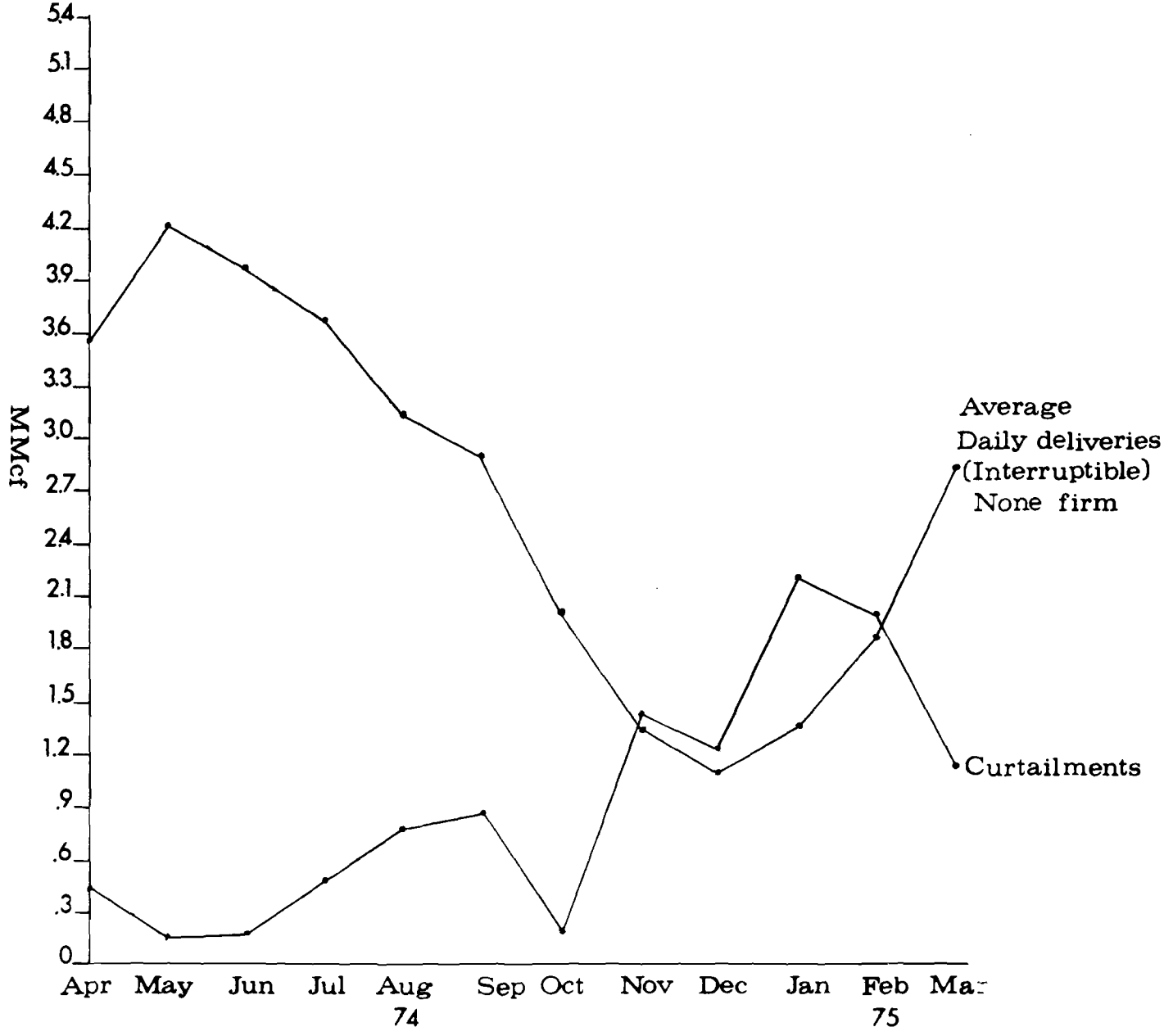
Merck and Company
Apr 74-Mar 75



Annual Amount Delivei	
Total	391 mi
Firm	0 mi
Interruptible	391 mi

Peak Day	
Firm	0 mi
Interruptible	1.44 mi
Total	1.44 mi

Chart XXII. **Natural Gas Data**
Minerals and Chemicals Co.
Apr 74-Mar 75

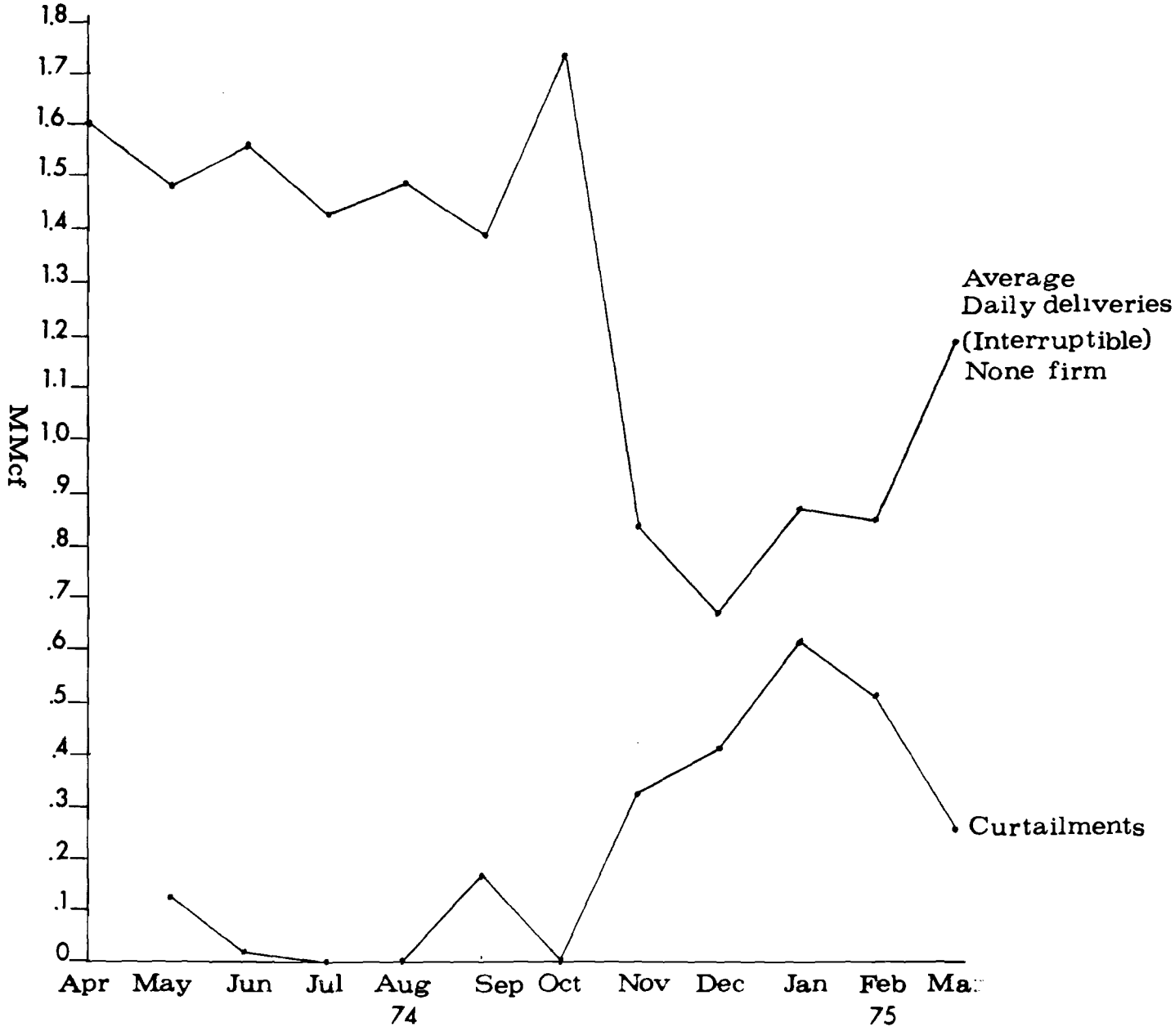


Annual Amount Delive:	
Total	967 mi
Firm	0 mi
Interruptible	967 mi

Peak Day	
Firm	0 mi
Interruptible	3.50 mi
Total	3.50 mi

Chart XXIII. Natural Gas Data

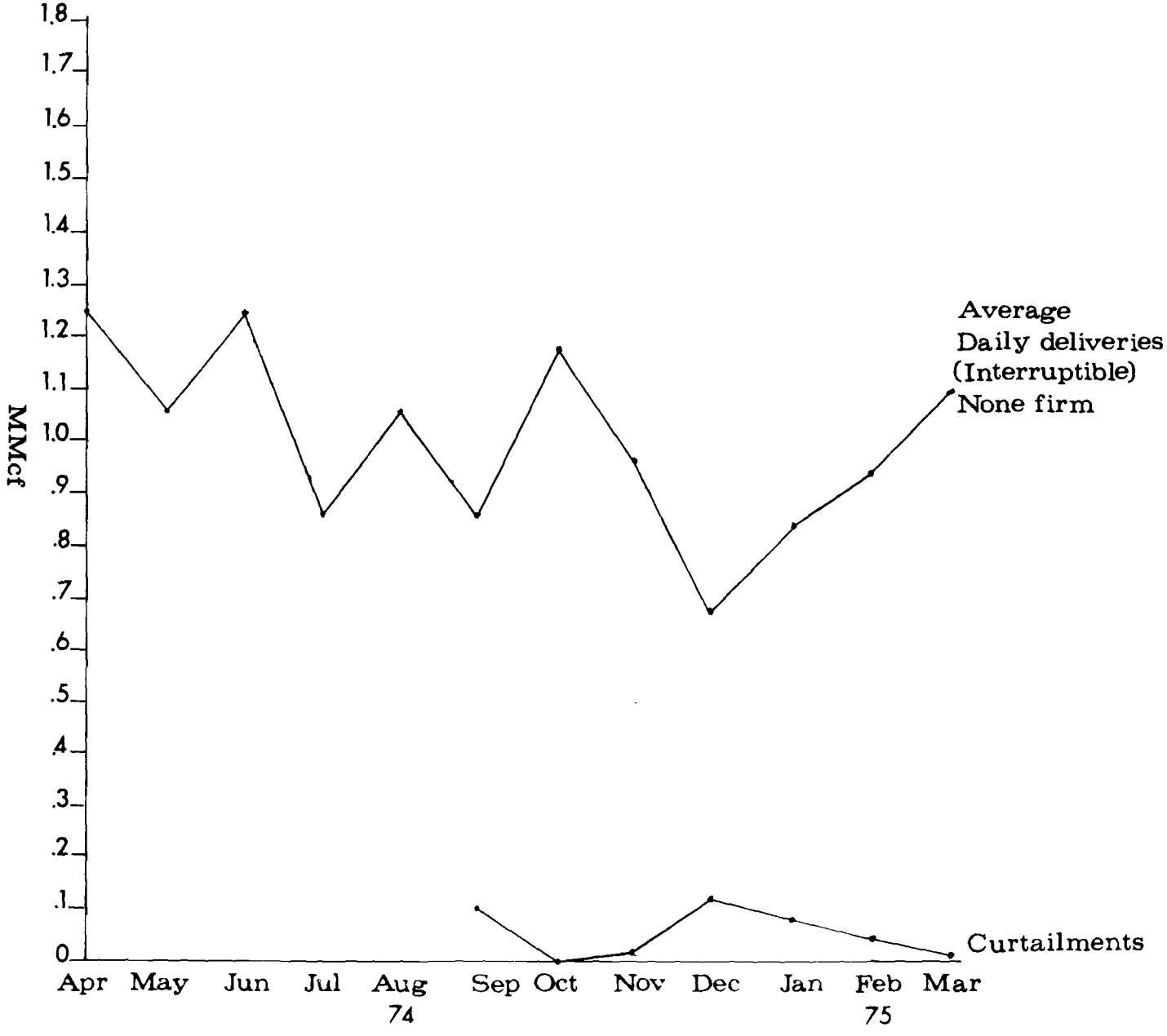
Waverly Corp.
Apr 74-Mar 75



Annual Amount Delive	
Total	458 mı
Firm	0 mı
Interruptible	458 mı

Peak Day	
Firm	0 mı
Interruptible	1.36 mı
Total	1.36 mı

Chart XXIV: Natural Gas Data
Oil-Dri Corp.
Apr 74-Mar 75



Annual Amount Delive

Total	365mı
Firm	0mı
Interruptible	365mı

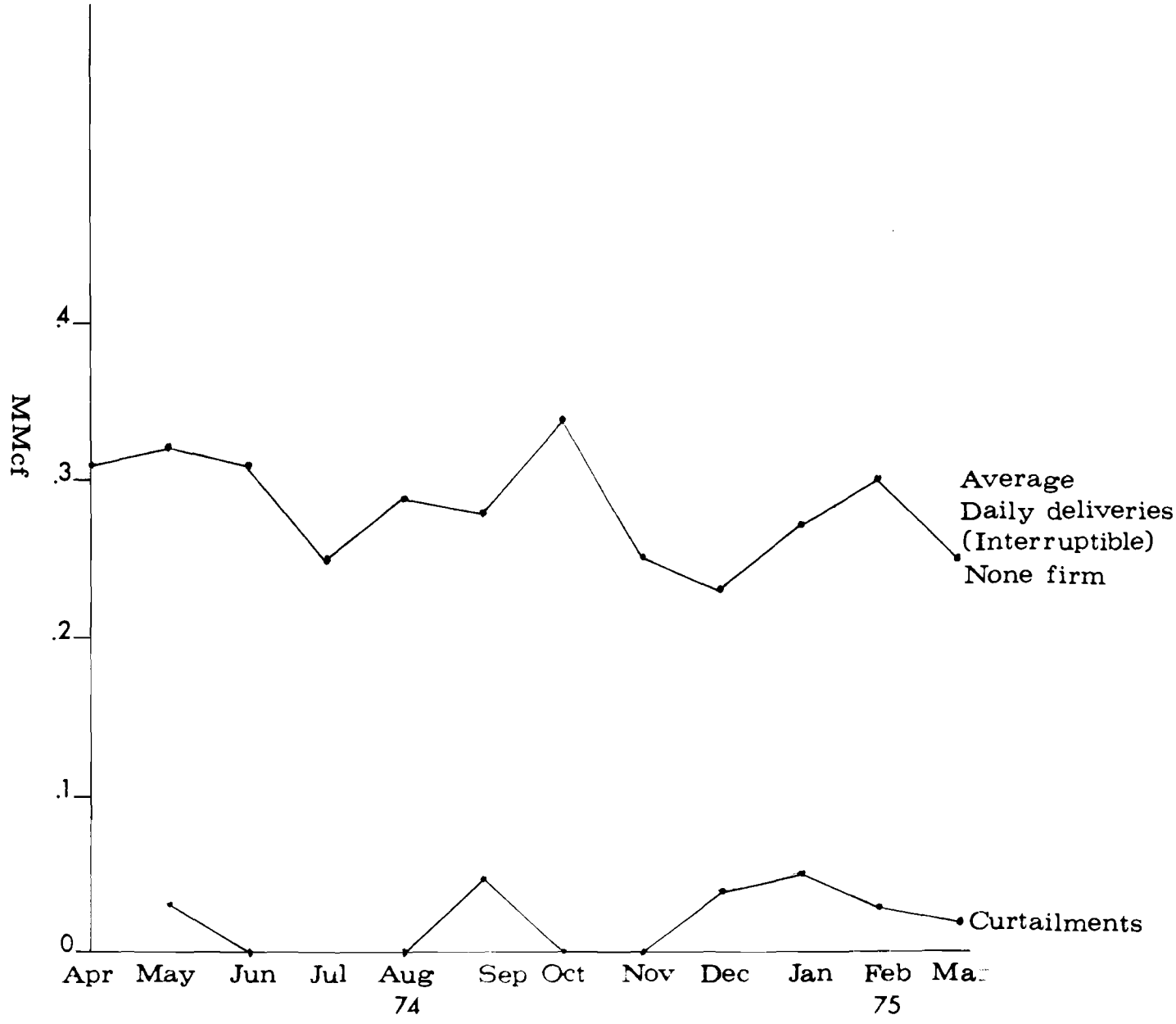
Peak Day

Firm	0mı
Interruptible	1.09mı
Total	1.09 mı

Chart XXV. Natural Gas Data

Milwhite Company

Apr 74-Mar 75



Annual Amount Delive	
Total	104 mi
Firm	0 mi
Interruptible	104 mi

Peak Day	
Firm	0 mi
Interruptible	.36 mi
Total	.36 mi

vent the gas from reverting to other areas. In view of Southern Natural's Curtailment plan, certain categories of interruptible customers would be the first to be curtailed. However, this is a chance every user takes. The point is simply that, if South Georgia is able to continue to meet contract demands, there is additional gas available for well selected interruptible customers, particularly low volume users.

As was the case with municipalities, additional long term data is needed with regard to those direct customers which would allow the researcher to get a total picture of the previous consumption patterns.

AGGREGATED NATURAL GAS DATA FOR THE AREA

The combined consumption of municipal customers and direct customers should be aggregated in order that consumption or demand could be projected; and, also, in order that consumption can be related to various economic indicators such as employment, output, etc.

SPECIAL DEMANDS

The previous demand-related discussion has dealt strictly with the overall consumption of natural gas (with the possible exception of some discussion of the general type of users - ie. residential, commercial, and industrial). No mention has been made of natural gas in the context of materials such as fertilizer, plastics, etc.

However, one of the objectives of the program design is that of identifying and isolating special or unique energy needs in the area.

One of the possible unique features of the substate area is a strong orientation to agriculture. Consequently, under the heading of agriculture, some activities or products may deserve special attention.

(a) Nitrogeneous Fertilizers. The following information obtained from soil scientists at the University of Georgia shows the relationship of natural gas to nitrogeneous fertilizers.

ENERGY REQUIREMENTS FOR

NH_3 manufacturing

Source: Fertilizer Progress Jan.-Feb., 1975

40,000 cu. ft. of natural gas

2/3 as feed stock

to fix one ton of NH_3 -

1/3 for energy

In addition, these scientists also indicated that the following amounts (Table XI) of nitrogen were necessary for the production of the following crops which are common to the substate area.

TABLE XI
N REQUIREMENTS PER ACRE FOR
VARIOUS SOUTHWEST GEORGIA CROPS

Crop	Pounds
Corn	150
Peanuts	20
Soybeans	20
Cotton	100
Tobacco	60
Cut Bermuda (Hay)	200
Cut Bermuda (Grazing)	150
Other Summer Grazing	100
Winter Grazing	120
Wheat	60
Melons	80
Vegetables	120

SOURCE: University of Georgia, Cooperative Extension Service

Tables XII through XVII show the acreages of various crops in the substate area as compared with the state. (Corn, wheat, cotton, peanuts, tobacco, soybeans). Acreages for other crops were not readily available but could be estimated if time permitted. This should be accomplished.

In any event, Tables XII through XVII show the total nitrogen requirement for these acreages (crops on which acreage is available). In addition, using the

TABLE XII
ACREAGES AND NITROGENEOUS FERTILIZER REQUIREMENTS FOR CORN
SOUTHWEST GOERGIA AND STATE: 1964-1974
PLANTED ACRES

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	16,400	14,100	53,500	47,300	11,500	31,800	41,900	13,900	31,800	44,300	20,700	18,200	44,000	36,600	426,000
1965	16,300	14,100	53,400	43,300	11,460	31,700	41,600	15,740	31,500	43,900	20,750	18,390	43,800	36,250	422,190
1966	16,000	13,800	53,300	43,300	11,400	31,200	40,700	15,000	30,900	42,900	20,400	17,900	42,900	36,400	416,100
1967	17,700	15,300	60,100	43,700	12,500	34,400	44,900	18,700	34,000	47,200	22,400	19,700	47,200	41,000	458,800
1968	17,400	15,000	58,700	42,200	12,200	35,200	45,700	16,800	34,300	47,700	23,100	19,200	47,500	40,100	455,100
1969	20,100	18,000	56,600	35,700	12,100	33,100	46,000	18,100	35,000	50,800	22,000	20,100	44,200	47,200	459,000
1970	18,700	15,950	58,200	37,400	11,300	32,400	41,200	13,900	33,500	48,700	21,200	20,800	43,200	48,600	447,050
1971	20,400	10,000	47,200	38,900	8,100	32,200	46,700	18,200	27,400	53,000	19,400	22,400	46,000	36,500	426,400
1972	18,300	9,650	42,400	37,700	7,200	28,800	40,100	15,400	24,700	47,800	17,500	20,100	40,900	32,800	383,350
1973	20,800	14,100	54,800	41,000	7,500	38,800	47,200	21,800	31,900	52,500	21,500	25,700	42,000	47,500	467,100
1974	23,900	14,200	59,500	43,200	9,600	38,900	50,200	28,500	34,000	55,300	21,200	26,700	48,000	53,000	506,200

State Total 1974 - 2,000,000 acres

150 pounds of "N" per acre required= Southwest Georgia "N" requirement for corn (506,200 x 150) = 75,930,000 pounds "N" (1974) ÷ 2,000 = 37.965 x 40,000 cu. ft. = 1.518 600,000 cu. ft. NG
State "N" requirement for corn (2,000,000 x 150) = 300,000.000 pounds "N" (1974) (plus 10% for replanting, etc). ÷ 2,000 = 150.000 tons x 40,000 = 6,000,000.000 cu. ft. NG

TABLE XIII
ACREAGES AND NITROGENEOUS FERTILIZER REQUIREMENTS FOR WHEAT
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	200	390	110	160	1,170	350	430	270	220	70	210	50	390	1,080	5,100
1965	170	320	100	140	950	280	390	250	180	50	180	50	340	900	4,300
1966	200	370	100	160	1,100	320	450	290	210	60	210	60	390	890	4,810
1967	720	630	150	380	2,310	1,630	960	720	960	220	770	650	1,140	1,670	12,910
1968	550	500	150	550	1,660	1,320	940	720	770	220	550	440	770	1,320	10,460
1969	280	280	---	650	550	530	810	450	460	150	140	230	200	720	5,750
1970	1,730	940	230	1,870	680	2,250	1,500	380	2,250	190	2,020	680	680	1,170	16,570
1971	4,650	2,510	640	5,400	1,940	6,940	3,590	570	6,700	330	7,360	1,540	1,600	2,780	45,650
1972	3,230	1,840	3,800	2,270	870	4,520	830	1,880	930	2,190	1,650	2,460	1,450	2,980	30,900
1973	890	810	2,070	2,030	610	2,450	550	920	640	1,920	2,020	2,120	780	1,830	19,640
1974	670	1,530	280	1,570	650	2,400	540	1,290	1,490	740	2,530	2,380	400	740	17,210

1974 State Total - 160,000 acres

60 pounds of "N" per acre required = State "N" Requirements for wheat (160,000 x 60) = 9,600,000 pounds of "N" (1974) ÷ 2,000 = 4,800 tons x 40,000 cu. ft. = 192,000,000 cu. ft. NG
Southwest Georgia "N" requirement for wheat (17,210 x 60) = 1,032,600 pounds "N" (1974) plus 10% for replanting, etc). ÷ 2,000 = 516 tons x 40,000 cu. ft. = 20,640,000 cu. ft. NG

TABLE XIV
ACREAGE AND NITROGENEOUS FERTILIZER REQUIREMENTS FOR COTTON
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	2,790	5,000	21,660	2,240	1,790	11,120	2,910	3,240	5,800	9,860	4,080	10,540	5,160	19,540	105,730
1965	2,350	4,670	20,140	1,700	1,830	9,630	2,450	3,080	5,120	8,710	3,940	9,710	4,130	18,280	95,740
1966	1,070	3,060	12,700	1,010	1,080	6,000	1,580	1,950	2,860	5,700	2,410	6,620	2,750	9,900	58,690
1967	630	2,480	12,300	440	770	4,060	490	1,590	1,760	3,840	1,230	6,700	1,680	9,200	47,170
1968	630	3,400	18,150	670	930	5,250	2,100	2,510	2,300	6,650	1,920	7,750	3,480	12,400	68,140
1969	700	3,450	16,800	155	850	5,850	1,950	2,200	2,550	5,900	2,200	8,300	2,850	12,600	66,355
1970	600	3,600	15,800	90	750	6,150	1,450	1,800	2,800	5,000	2,300	8,150	2,500	12,300	63,290
1971	250	3,800	16,400	150	250	6,500	600	2,000	1,200	3,500	1,600	10,100	2,000	11,000	67,350
1972	620	4,900	20,700	550	550	6,000	700	2,300	1,550	5,100	1,850	11,300	2,650	12,200	70,970
1973	140	4,420	19,000	515	360	5,300	205	2,270	900	3,960	1,460	9,950	1,940	8,850	59,270
1974	220	5,650	24,900	400	1,270	6,050	155	2,670	1,040	4,330	2,220	11,400	2,670	11,500	74,475

1974 State Total = 423,000 acres

100 pounds of "N" per acre required = State "N" requirement for cotton (423,000 x 100) = 42, 300,000 pounds of "N" (1974) ÷ 2,000 = 21,150 x 40,000 = 846,000,000 cu. ft. NG
Southwest Georgia "N" requirement for cotton (74,475 x 100) = 7,447,500 pounds "N" (1974) (plus 10% for replanting, etc.). ± 2,000 = 3,724 x 40,000 = 148,960 000 cu. ft. NG

TABLE XV
PEANUT ACREAGE AND NITROGENEOUS FERTILIZER REQUIREMENT
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	14,450	15,980	9,705	16,350	6,020	31,510	8,495	14,975	19,870	20,400	12,285	20,495	4,655	28,820	224,010
1965	14,050	16,435	9,865	16,575	6,085	31,740	8,600	15,090	20,050	20,525	12,370	20,990	4,680	28,945	226,000
1966	13,740	15,055	8,550	16,475	6,135	30,710	8,630	15,020	20,040	20,570	12,385	20,870	4,700	29,515	222,395
1967	13,705	15,190	10,005	16,410	6,180	29,770	8,605	15,040	19,830	20,035	12,275	20,260	4,620	29,130	221,055
1968	14,295	15,360	9,910	16,600	6,250	30,780	8,400	15,670	19,745	20,450	12,850	21,920	4,785	29,240	226,255
1969	14,385	15,355	9,915	17,290	6,255	31,050	8,415	15,495	19,725	20,365	12,870	22,305	4,850	29,240	227,515
1970	14,270	15,375	9,740	17,490	6,220	30,965	8,435	15,540	19,870	20,480	12,900	22,715	4,880	29,510	228,390
1971	14,395	15,480	10,010	17,650	6,955	31,150	8,575	15,560	19,725	20,540	12,975	22,810	4,940	29,100	228,865
1972	14,360	15,430	10,010	17,635	6,975	31,280	8,635	15,630	19,805	20,700	12,560	22,985	4,995	29,500	229,520
1973	14,880	16,646	10,220	18,141	6,014	33,373	8,831	16,036	19,919	21,505	12,869	23,563	5,195	29,951	237,143
1974	14,722	16,672	10,273	18,214	5,997	33,587	8,814	15,992	19,826	21,493	12,776	23,597	5,267	29,704	236,934

1974 State Total - 515,868

20 pounds of "N" per acre used (not required) = State "N" requirement for peanuts (515,868 x 20) = 10,317,360 pounds "N" (1974) ÷ 2,000 = 5,159 tons x 40,000 = 206,360,000 cu. ft. NG

Southwest Georgia "N" requirement for peanuts (236,934 x 20) = 4,738,680 pounds of "N" (1974) (plus 10% for replanting, etc.) ÷ 2,000 = 2,369 tons x 40,000 = 94,760,000 cu. ft. NG

TABLE XVI
TOBACCO ACREAGE AND NITROGEN FERTILIZER REQUIREMENT
SOUTHWEST GEORGIA AND STATE 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	5	-------	4,790	280	20	-----	1,180	---	------	1,955	--------	-------	1,415	1,540	11,185
1965	5	-------	4,065	225	15	-----	970	---	------	1,635	--------	-------	1,150	1,300	9,365
1966	5	-------	4,800	320	20	-----	1,300	---	------	2,100	--------	-------	1,600	1,550	11,695
1967	-	-------	5,255	270	20	-----	1,235	---	------	1,900	--------	-------	1,475	1,670	11,825
1968	-	-------	4,130	255	17	-----	990	---	------	1,700	--------	-------	1,220	1,310	9,622
1969	8	-------	4,280	255	18	-----	1,090	---	------	1,870	--------	-------	1,290	1,380	10,191
1970	-	-------	4,900	220	--	-----	1,250	---	------	1,950	--------	-------	1,560	1,570	11,450
1971	-	-------	3,930	290	25	-----	1,100	---	------	1,800	--------	-------	1,290	1,440	9,875
1972	-	-------	4,440	280	16	-----	1,090	---	------	1,950	--------	-------	1,420	1,490	10,686
1973	9	-------	4,770	348	26	-----	1,287	---	------	2,106	--------	-------	1,549	1,549	11,644
1974	5	-------	6,341	448	27	-----	1,600	---	------	2,674	--------	-------	2,026	1,951	15,072

1974 State Total - 34,365

60 pounds of "N" per acre required = State "N" requirement (34,365 x 60) = 2,061,900 pounds "N" (1974) ÷ 2,000 = 1,031 tons x 40,000 = 41,240,000 cu. ft. NG
Southwest Georgia "N" requirement (15,072 x 60) = 904,320 pounds "N" (1974) (plus 10% for replanting, etc.) ÷ 2,000 = 452 tons x 40,000 = 18,080,000 cu. ft. NG

TABLE XVII
SOYBEAN ACREAGE AND NITROGEN FERTILIZER REQUIREMENT
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	-----	150	410	370	740	190	-----	1,510	------	220	200	260	1,370	860	6,280
1965	130	200	550	500	990	250	-----	2,030	------	1,290	270	350	1,850	1,160	9,570
1966	480	820	1,890	730	2,880	360	-----	2,930	2,000	1,880	650	1,000	2,670	3,590	22,910
1967	1,700	3,000	4,900	3,000	3,500	2,500	-----	5,800	1,800	3,000	1,600	3,000	6,800	5,000	45,600
1968	1,300	2,300	2,800	1,800	1,800	1,900	-----	4,600	900	1,800	1,000	2,300	4,600	2,700	29,800
1969	1,300	1,800	1,200	950	700	1 900	-----	4,300	350	1,200	850	2,000	3,900	1,400	21,850
1970	1,100	3,400	1,600	2,000	800	2,100	-----	4,400	1,200	2,000	1,200	3,000	7,900	3,000	32,700
1971	920	2,200	2,100	3,600	1,000	2,300	-----	5,200	2,100	2,700	1,700	4,300	11,900	4,600	46,620
1972	2,000	4,000	3,400	6,700	1,200	2,200	-----	7,400	3,400	2,600	2,200	4,600	13,000	4,600	57,300
1973															
1974	3,200	6,600	6,200	9,800	3,250	6,800	6,900	10,000	5,250	4,000	6,350	8,900	22,850	4,300	104,400

1974 State Total - 1,010,000 acres.

20 pounds of "N" required per acre = State "N" requirement (1,010,000 x 20) = 20,200,000 pounds of "N" (1974) ÷ 2,000 = 10,100 tons x 40,000 = 404,000,000 cu. ft. NG
Southwest Georgia "N" requirement (104,400 x 20) = 2,088,000 pounds of "N" (1974) ÷ 2,000 = 1,044 tons x 40,000 = 41,760,000 cu. ft. NG

previously mentioned natural gas requirement for producing a ton of NH_3, the natural gas requirement for the substate area for nitrogeneous fertilizer for these crops can be estimated.

Combining these natural gas requirements for fertilizer for these crops, the 1974 comsumption would be as follows (not allowing 10% for replanting, etc.).

Crop	Southwest Georgia Area (Cubic feet natural gas)	State (cubic feet natural gas)	Southwest Georgia As percent of State
Corn	1,518,600,000	6,000,000,000	25.3
Wheat	20,640,000	192,000,000	10.8
Cotton	148,960,000	846,000,000	17.6
Peanuts	94,760,000	206,360,000	45.9
Tobacco	18,080,000	41,240,000	43.8
Soybeans	41,760,000	404,000,000	10.3
Total	1,842,800,000	7,689,600,000	24.0

For these five crops alone, the natural gas requirement (for nitrogeneous fertilizer) for the Southwest Georgia area is over 40 percent of that required for the entire City of Albany which has almost 100,000 people.

Furthermore, these 14 counties account for almost 25 percent of the state's natural gas requirement for these crops.

Only a small part of the basic nitrogen requirement of crops is manufactured in the area, with the majority being imported from other areas. Additional research should be accomplished which would allow researchers to quantify the actual amount produced versus that imported.

Regardless of where the nitrogen is manufactured, a substate energy plan should recognize the extent of these special needs. No doubt, there are other areas of the country which have a large nitrogen fertilizer requirement; and, also, other sections which do not have this requirement. These considerations should be kept in mind in developing a natural gas management plan.

The trends in crop acreage as well as the increasing nitrogen requirements offer an excellent opportunity to project the needs for nitrogen fertilizer for agricultural requirements. This data would also be useful in measuring the impact of shortages of natural gas on crop production and the food supply.

b. Crop Drying

While the previous discussion of nitrogen fertilizer involved a derived demand, there is another unique feature of the area - that of crop drying.

The substate area, in 1974, produced 378,708 tons of peanuts or 45.7 percent of the state total of 829,250 tons. This substate total also represents over 20 percent of United States production of peanuts.

Virtually all of these peanuts are artifically dried, normally from about a 22 percent moisture content to a 10 percent moisture content. Roughly 50 percent of the peanuts are dried with natural gas and 50 percent with LP gas.

Table XVIII provides various types of data relating to the subject of peanut drying.

Also, Chart XXVI provides additional data relating to the BTU requirements for drying peanuts.

One characteristic of this special requirement for natural gas is that it occurs within a very short period of time starting approximately in mid-August and extending to about October 1.

Usage is extremely high during the period; and, since about 50 percent of the drying uses natural gas, it possibly could tax the natural gas systems. On the other hand, the drying is during the summer off-season; and, in some instances, could be an example of good utilization of the gas - both in terms of summer revenue for the municipalities as well as generating more income for the substate economy.

Additional information regarding individual customers, etc., is needed to further evaluate the impact of this activity on the total system.

Table XIX shows essentially the same type data as Table XVIII except as related to corn. Drying of corn and other grain is not as prevalent as that of peanuts.

TABLE XVIII
PEANUT PRODUCTION AND GAS REQUIREMENTS FOR DRYING[1]
SOUTHWEST GEORGIA AND STATE 1964-1974
(1,000 lbs.)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total lbs.	Total Tons
1964	25,023	30,362	16,385	28,691	10,056	51,438	14,499	25,744	36,175	34,848	21,947	32,409	6,845	50,569	384 991	192,496
1965	25,403	33,314	19,894	29,162	10,703	56,008	14,640	27,971	36,704	36,468	23,052	35,134	8,206	55,215	411,874	205,937
1966	21,015	18,182	15,269	28,063	9,845	47,770	13,799	25,659	38,040	33,329	20,989	29,767	8,197	52,677	362,601	181,301
1967	26,963	31,927	24,239	29,238	12,470	54,624	17,246	31,703	42,570	40,893	26,223	40,289	9,388	62,255	450,028	225,014
1968	27,425	30,055	20,394	30,111	10,695	52,016	16,027	30,516	41,176	42,072	22,435	39,271	10,237	60,243	432,673	216,336
1969	27,710	32,382	18,048	28,853	11,858	55.689	15,661	28,940	38,355	41,444	25,043	41,522	8,074	57,339	430,918	215,459
1970	32,562	34,802	20,545	40,099	12,462	66,392	18,790	32,733	47,290	46,332	31,168	43,570	9,983	63,922	500,650	250,325
1971	36,988	37,991	25,313	45,915	13,967	70,609	19,719	36,160	55,475	47,607	36,268	46,611	10,918	68,509	552,050	276,025
1972	36,237	38,937	26,520	47,004	15,747	69,275	24,470	46,346	47,701	49,774	27,954	55,383	13,693	85,658	584,699	292,350
1973	38,394	43,018	25,236	50,863	14,469	80,089	21,585	41,871	54,299	46,932	34,375	50,332	12,405	83,954	597,822	298,911
1974	47,579	54,871	29,420	67,124	19,012	100,162	30,401	54,874	71,409	60,602	42,822	69,586	16,601	92,953	757,416	378,708

1974
State Total = 829,250 tons X

9.21 gallons[2] L.P. gas per ton = 7,637,393 gallons X .43 = $3,284,079

821.8[2] cubic feet of natural gas per ton = 681,477,650 cubic feet x $1.25 = $851,848

1974 Southwest Georgia Area Total = 378,708 tons X

9.21 gallons L.P. gas per ton = 3,484,114 gallons x .43 = $1,498,169

821.8 cubic feet natural gas per ton = 311,222,234 cubic feet x $1.25 = $389,028

Percent Increase
Southwest Georgia 1964 - 1974 96.7%

Average Annual Increase Production Southwest Georgia (10 Years) 9.67%

Contrast - Camilla uses about 128,000,000 cubic feet annually as compared with 311,222, 234 cubic feet to dry peanuts (if only natural gas not L.P. was used). (1974)

[1]Assumes 22% moisture to 10% moisture - removing 12% - Source, Lawton Samples - University of Georgia Cooperative Extension Service.
[2]9.21 gallons L.P. gas = 821.8 cubic feet natural gas.

Chart XXVI **BTU's Consumed for Peanut Drying in Southwest Georgia 1964-74 with projections to 1980 (millions)**

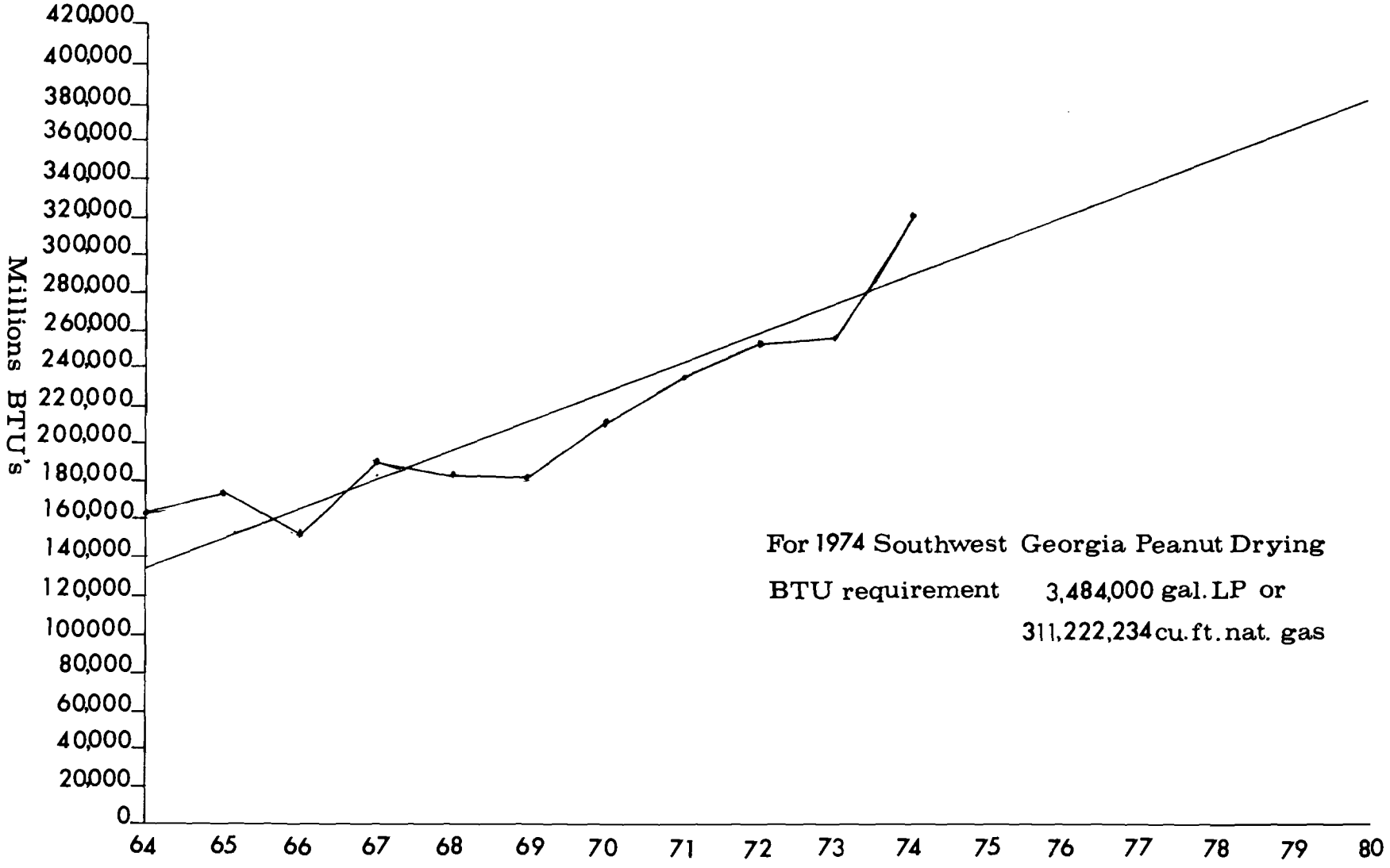


TABLE XIX
CORN PRODUCTION AND FUEL DRYING REQUIREMENTS
SOUTHWEST GEORGIA AND STATE 1964 - 1974
(000 bushels)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	562	599	2,117	1,270	403	969	1,667	546	944	1,456	668	798	1,755	1,382	15,136
1965	812	718	2,510	1,397	503	1,461	1,918	622	1,358	1,831	905	937	2,176	1,662	19,010
1966	578	526	2,152	1,411	361	1,075	1,951	529	1,069	1,744	722	723	2,048	1,457	16,346
1967	973	1,005	3,542	2,049	629	1,974	2,348	871	1,763	2,649	1,079	1,283	2,856	2,509	25,530
1968	692	387	2,747	1,360	358	1,090	1,276	533	1,181	1,930	795	748	2,228	1,553	16,878
1969	363	457	1,318	784	279	760	1,200	714	667	1,444	400	759	1,000	1,175	11,320
1970	478	454	1,552	1,204	281	834	1,302	484	897	1,585	536	554	1,204	1,405	12,770
1971	907	537	2,633	1,670	421	1,504	2,412	1,034	1,272	2,556	793	1,409	2,599	1,901	21,648
1972	918	467	2,481	1,246	326	1,205	1,770	741	1,016	2,154	683	988	2,322	1,569	17,886
1973	998	616	2,274	1,697	359	1,512	2,095	1,283	1,047	2,084	603	955	1,853	2,294	19,670
1974	1,287	868	3,226	2,358	538	2,141	2,751	1,786	1,526	2,819	1,173	1,547	2,748	2,758	27,526

1974 State = 105,280,000 bushels = 2,947,840 tons x 5% = 147,392 tons x
9.21[1] gallons L.P. gas per ton = 1,357,480 gallons x .43 = $583,716
821.8 cubic feet natural gas per ton = 121,126,746 cubic feet x 1.25[2] = $151,408

1974 Southwest Georgia Area Total 27,526,000 bu. = 770,728 tons x 5% = 38,536 x
9.21 gallons L.P. Gas per ton = 354,917 gallons x .43 = $152,614
821.8 cubic feet natural gas per ton = 31,668,885 cubic feet x 1.25[2] = $39,586

Percent Increase Southwest Georgia 1964-1974 = 81.9%

Average annual increase production Southwest Ga. - 8.2%

NOTE: While drying corn is a relatively small item at the present time it has the potential for consuming large amounts of fuel for drying if early harvest becomes more prevelent.

[1]Approximately 10 percent (1974) of corn is harvested at about 22% moisture content which must be dried down to 15.5 percent. However, of this 10 percent, approximately 5 percent is not dried. Rather it is either stored in an air-tight bin or treated with a preservative. Consequently, only 5 percent of this corn crop is dried with natural or L.P. gas. This, of course, is subject to change in any direction depending on various factors such as price, habits, locations, etc.

[2]This analysis assumes the same BTU requirements for drying as does peanuts.

However, if energy does not become too expensive, the area would see a substantial increase in corn drying as well as the drying of other grain crops and soybeans.

c. Other Special Needs

With the exception of the previously mentioned cases and other individual heavy industrial users of natural gas, no other special needs appear to be prevalent. However, the researcher, in developing the plan, should be alert to the possibility that other cases exist as additional data is collected.

II. SUPPLY

No real or meaningful indicator of supply is available at this time. The present outlook is extremely gloomy.

If and when some decisions are made at the national level, it may be somewhat easier to assess the supply situation. However, it is safe to assume that the substate area should plan to manage their present allotments better and possibly be prepared to accept additional curtailments and reduced allotments.

III. IMPACT ANALYSIS

The shortage of natural gas has already had, and will continue to have, a very detrimental impact on the substate area economy, both in personal hardships and economic activity.

Almost any local official who deals or works with industrial solicitation and promotion in the substate area will document the fact that they have lost potential manufacturing operations due to lack of natural gas availability. This is not new. It has been a problem for some time.

Certainly, this, along with other economic conditions, has contributed to a somewhat stagnant substate economy with considerable unemployment.

If the natural gas shortage becomes as critical as projected, it again is very clear that existing industries will be forced to close either temporarily or permanently, unless they can utilize alternate fuels.

Thus, it becomes even more important to really analyze the industrial customer

in terms of which ones can or cannot use alternate fuels. Natural gas must be managed in order that the impact of the shortage can be lessened and the supply fully utilized.

In order to arrive at some quantitative measurement of the impact, it will be necessary to utilize the past consumption and demand patterns and projections described in the "Demand" section.

This demand data would be related to the various economic sectors as follows:

INDUSTRIAL

1. Determine names and numbers of the heavy users of natural gas.
2. Estimate quantities used by these larger users.
3. Evaluate seasonal consumption pattern of these users.
4. Ascertain which of these firms could use alternate fuels during peak periods.
5. Estimate and evaluate the practicality and cost of conversion to other supplemental energy sources for these firms and/or possibility of more summer production and storage of manufactured goods.
6. Evaluate practicality of supplier forcing change on some of the heavy users, particularly when they contribute significantly to peak - ie. legal aspects, political problems, existing contracts, reaction of firms, etc. - will they close down rather than adjust? Evaluate this approach against the effect of no planned reductions or adjustments.
7. The above six steps represent a method by which management efforts are directed to the large users on a compromise - type approach. It also offers an opportunity to obtain some idea of the impact on the area in terms of jobs lost, etc. However, this should be supplemented with a second more general approach which would provide some indication of the impact such as:

(a) Relating total substate population trends to total industrial gas consumption (historically).

(b) Relating total substate employment to total industrial gas consumption (historically).

(c) Relating total substate manufacturing employment to total industrial gas consumption (historically).

(d) Having established these relationships between employment and natural gas consumption, project employment losses due to cut-back in natural gas consumption. In addition, using a multiplier effect, measure the total impact of lost jobs on the economy. (See Table XX for substate manufacturing employment trends which could be used as base data).

RESIDENTIAL

Utilizing billing information from municipalities (and possible sample survey) compute percent of housing utilizing natural gas (for various purposes if possible). The 1970 Census of Housing can be used to measure the extent of natural gas in utilization in the residential sector (Some of this base information is presented in Table XXI). To some extent (utilizing known energy requirements per hour of operation, etc.) energy consumption for various types of appliances and heating systems, etc. can be measured. A detailed analysis of this Census of Housing data can be useful in identifying further problems and possible solutions. It would tend to answer such questions as how many people would be affected and the extent of the effect. It would suggest the amount of involvement and cost in changing from one energy source to another if such changes became necessary and desirable. If some monetary incentives were involved this would help to evaluate the cost of alternatives. It is likely that the Federal government will come out with monetary incentives of some type. The substate area could share in this.

TABLE XX
MANUFACTURING EMPLOYMENT
SOUTHWEST GEORGIA AREA

MANUFACTURING CATEGORY	1965 MALE	1965 FEMALE	1965 TOTAL	1967 MALE	1967 FEMALE	1967 TOTAL	1969 MALE	1969 FEMALE	1969 TOTAL
20-Food & Kindred Products	3,889	1,473	5,362	3,852	1,558	5,410	3,954	1,909	5,863
21-Tobacco	10	0	10	7	0	7	10	0	10
22-Textile Mills	1,558	1,001	2,559	1,590	1,046	2,636	1,440	1,453	2,893
23-Apparel From Fabric	285	2,970	3,255	335	3,172	3,507	535	3,670	4,205
24-Lumber & Wood Products	1,421	255	1,676	1,493	274	1,767	1,185	277	1,462
25-Furniture & Fixtures	276	48	324	283	57	340	327	79	406
26-Paper & Allied Products	145	26	171	123	6	129	111	5	116
27-Printing & Publishing	309	95	404	305	110	415	298	136	434
28-Chemicals	1,000	71	1,071	1,019	81	1,100	867	78	945
29-Petroleum Products	25	5	30	25	5	30	16	8	24
30-Rubber & Plastics	158	61	219	155	73	228	1,087	162	1,249
31-Leather & Leather Products	-----	-----	-----	-----	-----	-----	-----	-----	-----
32-Stone, Clay & Glass	741	32	773	802	38	840	889	33	922
33-Primary Metals	39	1	40	63	2	65	80	3	83
34-Fabricated Metal Products	584	270	854	690	209	899	953	263	1,216
35-Machinery, Except Electrical	926	76	1,002	1,112	84	1,196	918	70	988
36-Electrical Machinery	121	147	268	177	188	365	89	276	365
37-Transportation Equipment	621	106	727	980	165	1,145	1,336	276	1,612
38-Professional, Scientific & Controlling Industries	-----	-----	-----	-----	-----	-----	160	15	175
39-Miscellaneous Products	208	156	364	318	205	523	266	188	454
07-Agricultural Services	137	8	145	175	8	183	115	14	129
14-Mining	77	4	81	96	4	100	34	2	36
51-Processing Peanuts & Pecans	383	286	669	440	164	604	380	179	559
TOTAL MANUFACTURING EMPLOYMENT	12,913	7,091	20,004	14,040	7,449	21,489	15,050	9,096	24,146

TABLE XX
MANUFACTURING EMPLOYMENT
SOUTHWEST GEORGIA AREA (Continued)

MANUFACTURING CATEGORY	1971 MALE	1971 FEMALE	1971 TOTAL	1973 MALE	1973 FEMALE	1973 TOTAL	1975 MALE	1975 FEMALE	1975 TOTAL
20-Food & Kindred Products	3,737	1,679	5,416	3,861	1,749	5,610	3,974	1,791	5,765
21-Tobacco	2	0	2	-----	-----	-----	0	0	0
22-Textile Mills	1,354	1,187	2,541	1,593	1,642	3,235	1,691	1,727	3,418
23-Apparel From Fabric	573	3,781	4,354	710	4,635	5,345	568	4,570	5,138
24-Lumber & Wood Products	1,007	232	1,239	2,768	375	3,143	1,617	335	1,952
25-Furniture & Fixtures	333	153	486	443	209	652	295	167	462
26-Paper & Allied Products	133	10	143	1,431	179	1,610	1,698	239	1,937
27-Printing & Publishing	335	171	506	379	243	622	349	238	587
28-Chemicals	814	78	892	767	104	871	1,039	120	1,159
29-Petroleum Products	176	14	190	180	15	195	73	14	87
30-Rubber & Plastics	1,438	401	1,839	2,007	720	2,727	1,908	620	2,528
31-Leather & Leather Products	13	0	13	51	3	54	36	1	37
32-Stone, Clay & Glass	901	48	949	981	59	1,040	931	52	983
33-Primary Metals	85	4	89	97	17	114	94	21	115
34-Fabricated Metal Products	687	263	950	855	367	1,222	1,005	260	1,265
35-Machinery, Except Electrical	839	76	915	898	83	981	1,488	202	1,690
36-Electrical Machinery	39	276	315	99	407	506	56	253	309
37-Transportation Equipment	1,630	234	1,864	812	267	1,079	410	230	640
38-Professional, Scientific & Controlling Industries	250	35	285	270	50	320	69	12	81
39-Miscellaneous Products	192	138	330	481	293	774	280	228	508
07-Agricultural Services	124	14	138	123	14	137	151	11	162
14-Mining	101	7	108	96	6	102	78	8	86
51-Processing Peanuts & Pecans	282	192	474	382	175	557	380	88	468
TOTAL MANUFACTURING EMPLOYMENT	15,045	8,993	24,038	19,284	11,612	30,896	18,315	11,062	29,377

TABLE XXI

TOTAL FUEL CONSUMPTION IN HOUSING BY TYPES & USE
FOR 14 INDIVIDUAL COUNTIES, SOUTHWEST GA., GA. & THE U. S.

Types of Fuel	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Georgia Total	Southwest Georgia Total	Southwest Georgia as Percent of State
House Heating Fuel																	
Utility Gas	51	375	4,092	2,191	16,267	854	1,743	72	252	2,099	246	773	4,365	819	808,597	34,199	4.2
Fuel Oil, Kerosene, Etc.	20	66	692	160	2,057	294	54	112	71	136	18	124	632	84	67,956	4,520	6.7
Coal or Coke	-----	19	86	25	588	44	-----	25	-----	37	-----	308	64	21	24,754	1,217	4.9
Wood	259	325	719	1,095	914	595	567	332	282	761	349	398	971	652	66,604	8,219	12.3
Electricity	124	275	644	793	1,978	415	222	295	281	547	565	177	389	346	147,123	7,051	4.8
Bottled Tank or LP Gas	676	702	3,531	2,148	3,369	1,501	2,625	896	958	1,689	749	1,390	3,691	2,223	250,328	26,148	10.4
Other Fuel	-----	14	24	-----	------	-----	-----	-----	-----	23	-----	22	-----	-----	2,519	83	3.3
None	-----	19	-----	-----	17	20	-----	-----	-----	82	-----	-----	-----	-----	1,344	138	10.3
Water Heating Fuel																	
Utility Gas	-----	73	1,732	905	5,617	377	583	41	18	869	109	169	2,611	188	607,525	13,292	2.2
Fuel, Oil, Kerosene, Etc.	-----	-----	-----	16	19	-----	-----	-----	-----	-----	18	-----	20	22	1,922	95	4.9
Coal or Coke	-----	-----	-----	-----	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	820	0	0
Wood	18	-----	76	20	90	-----	41	-----	-----	21	-----	-----	71	-----	1,762	337	19.1
Electricity	611	913	5,990	3,345	16,996	2,162	2,284	1,120	1,303	3,048	1,267	1,797	3,889	2,480	546,703	47,205	8.6
Bottled Tank or LP Gas	106	196	762	562	678	187	1,205	69	199	401	60	234	1,833	473	72,987	6,965	9.5
Other Fuel	-----	22	-----	-----	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	1,270	22	1.7
None	395	591	1,228	1,564	1,790	997	1,098	502	324	1,035	473	992	1,688	982	136,206	13,659	10.0
Cooking Fuel																	
Utility Gas	-----	198	2,048	911	5,657	465	732	24	58	1,024	20	208	2,120	203	445,952	13,668	3.1
Electricity	610	1,115	6,115	3,667	16,588	2,178	2,906	1,241	1,463	3,190	1,668	2,143	5,422	3,002	750,270	51,308	6.8
Bottled, Tank or LP Gas	442	287	1,462	1,336	2,159	725	1,382	359	279	842	186	504	1,942	671	135,235	12,576	9.3
Fuel Oil, Kerosene, Etc.	-----	44	51	36	159	51	33	14	19	-----	-----	-----	87	61	4,031	555	13.8
Coal or Coke	-----	-----	-----	-----	142	-----	-----	-----	-----	14	-----	44	-----	-----	2,301	200	8.7
Wood	78	151	97	462	465	304	138	94	25	264	35	269	461	186	27,779	3,029	10.9
Other Fuel	-----	-----	-----	-----	------	-----	-----	-----	-----	-----	18	24	-----	-----	423	42	9.9
None	-----	-----	15	-----	20	-----	20	-----	-----	40	-----	-----	80	22	3,234	197	6.1
Clothes Dryer																	
Gas Heated	-----	21	65	41	255	------	20	-----	42	101	-----	66	126	89	57,573	826	1.4
Electrically Heated	94	386	2,365	1,308	7,470	688	905	317	421	981	668	715	1,799	927	405,015	19,044	4.7
None	1,036	1,388	7,358	5,063	17,465	3,035	4,286	1,415	1,381	4,292	1,259	2,411	8,187	3,129	906,637	61,705	6.8
Total Occupied Housing Units	1,130	1,795	9,788	6,412	25,190	3,723	5,211	1,732	1,844	5,374	1,927	3,192	10,112	4,145	1,369,225	81,575	6.0

AGRICULTURE

The previous section on "Demand" more or less outlined the relationship of natural gas consumption to agriculture. Other than farm-related residential use, the major use of natural gas in agriculture is in crop drying and in the preparation of nitrogeneous fertilizers.

Considerable data was developed in the demand section which showed crop acreages and crop production over a period of time, per unit drying requirements, per acre nitrogen requirements, etc. This data base, if expanded somewhat, can be used to project natural gas requirements for agricultural purposes. Utilizing these data, the impact of any anticipated natural gas shortages on agricultural production can be measured. This impact can also be traced through to show the more general impact on the substate economy.

As pointed out earlier, much of the nitrogeneous fertilizer is imported into the area. Consequently, very little of the natural gas allotment in the substate area goes toward nitrogeneous fertilizer production.

No doubt, agriculture will be given preferential treatment in terms of allocating natural gas for fertilizer, since the food supply is involved. This fertilizer import situation appears to be a very definite plus for the substate areas, since we do not have to use substate gas allocations for this purpose.

This, however, does not invalidate the need to show the high level of agricultural activity in the area in order that fertilizer will be allocated properly to the substate area; and, as stated earlier, the impact of not receiving the proper allocation (in terms of reduced yeids, less acreage, etc.) can be shown.

COMMERCIAL

It is not anticipated that the commercial sector (for the most part) would be affected directly. They would, however, be affected indirectly or through a chain reaction through the impact on industrial or manufacturing, agriculture and from the residential impact (to the extent that prices were a big factor in the allocation or rationing process). Consequently, the impact on commercial inter-

ests should be treated as a derived impact and will be automatically reflected in the impact of industrial, agricultural and residential.

IV. SPECIFIC MANAGEMENT AND CONSERVATION PRACTICES

In cases where allocation or rationing programs are not directed specifically to an individual consumer, the burden of planning and implementing these practices will fall on local governments and or suppliers and will involve mandatory policies or laws. At the least, it will necessitate that local governments and suppliers work with users in developing these plans.

Some possible management and conservation practices are:

1. Revision of residential and, possibly, commercial rate structures to encourage less use during winter months.
2. Working in conjunction with heavy industrial users, devise a working hours arrangement to reduce the problem of peaking. This may not help the overall problem in natural gas as much as it would in electrical power.
3. Analysis of additional peak shavings plants.
4. After evaluation of supply and demand for energy form various sources, consider alternate energy sources in terms of complete switchovers or on a supplementary basis. This would involve all sectors, including the local government's own operations.
5. Possibly revise industrial rate structure.
6. Rather than adopting a policy of no new customers, solicit these firms that can use natural gas in the summer and that could use alternate fuels in the winter months.
7. Consider some of the same type programs as outlined in electrical sections, such as facilitative legislation with regard to insulation and other construction oriented savings.
8. Discourage residential use of natural gas.

V. SUMMARY OF RECOMMENDED APPROACH

It is recommended that a complete and detailed energy audit or analysis be completed in each of the communities which retail natural gas. The audits would be of the same type as those recommended for electricity. In fact, as stated in the section on electricity, the audits of gas and electricity (in those communities having both) would have to be conducted simultaneously.

As was the case with electricity, the program calls for additional historical data with regard to natural gas usage, type customers, evaluation of rate structure and considerations involving the possible establishment of policies leading to better management and fuller use of the natural gas resources.

One additional point, local officials may not wish to take the political risks involved in actually implementing the programs as described above. Should this be the case, perhaps some parts of the program could be developed on a contingency basis.

GASOLINE AND DIESEL FUELS

I. DEMAND

Due to differences in marketing structure gasoline and diesel, as well as L.P. Gas, must be viewed somewhat differently from electrical energy and natural gas. That is, gasoline and diesel (and L.P. Gas) are distributed or marketed through the private sector; while electrical power and natural gas, to a large degree, are distributed by local governments in the substate area.

While these differences exist and must be considered in terms of "management or conservation", it does not change the fact that consumption or demand should be considered as a basic starting point.

The State Department of Revenue maintains consumption records for taxable gasoline and diesel. This information was obtained for the fiscal years 1968/1969 through 1974/1975 and is presented in Table XXII. Observation of this table shows that consumption in the state increased rather steadily, going from 2,271,904,344 gallons in fiscal year 1968/1969 to 3,085,207,803 gallons in 1972/73.

While the 1973/1974 figures also showed some increase, the 1974/1975 consumption levels fell back to the 1972/1973 level.

Consumption in the 14-county substate area essentially followed this same trend, going from 136,106,911 gallons in 1968/1969 to 172,809,528 in 1972/1973. Consumption increased some in 1973/1974 to 177,191,191 gallons but fell back to 175,418,334 in 1974/1975.

According to State Revenue Officials, this downward trend is still prevalent. Consumption decreased for the months of July, August and September of 1975.

For whatever reasons, less gasoline and diesel are being used in the substate area even though a considerable surplus of both is currently available.

While the "taxable" gasoline and diesel data provided in Table XXII provides some indication of trends in consumption, there are some problems pertaining to this data.

TABLE XXII
TAXABLE GASOLINE AND TAXABLE DIESEL CONSUMED IN
SOUTHWEST GEORGIA FOR SELECTED YEARS
(Gallons)

County	7-01-68 6-30-69	7-01-69 6-30-70	7-01-70 6-30-71	7-01-71 6-30-72	7-01-72 6-30-73	7-01-73 6-30-74	7-01-74 6-30-75
Baker	1,611,097	1,518,959	1,992,098	2,058,305	2,063,798	2,112,700	1,856,124
Calhoun	3,498,859	3,477,166	3,389,877	3,976,401	4,278,037	3,915,943	4,018,996
Colquitt	16,838,134	18,405,109	18,329,839	18,487,626	20,405,267	20,125,653	19,702,806
Decatur	12,784,011	14,313,591	16,078,943	17,609,326	16,402,423	16,475,177	18,564,032
Dougherty	38,562,565	42,939,691	47,144,035	50,909,425	54,951,690	56,805,469	54,580,545
Early	5,083,960	5,529,867	5,901,016	7,191,089	6,601,960	7,338,973	7,703,326
Grady	6,225,871	6,441,186	7,007,093	7,375,511	7,926,045	8,760,111	8,829,759
Lee	1,778,800	2,371,990	2,237,641	2,455,280	2,627,593	2,746,446	2,702,751
Miller	4,482,925	5,097,541	5,750,561	5,314,136	5,193,274	5,084,334	5,518,313
Mitchell	8,725,699	8,772,519	9,177,760	9,451,066	10,321,456	10,632,585	10,137,136
Seminole	4,422,176	4,766,051	5,210,456	5,558,867	5,996,579	6,905,738	6,686,181
Terrell	5,154,783	5,507,722	5,827,316	6,294,082	6,901,407	6,662,192	6,886,129
Thomas	17,264,499	18,072,552	18,660,545	19,542,329	20,240,835	21,132,653	20,721,591
Worth	9,673,532	9,805,999	8,007,487	8,465,403	8,899,164	8,493,215	7,510,645
Total	136,106,911	147,019,943	154,714,667	164,688,846	172,809,528	177,191,191	175,418,334
State	2,271,904,344	2,448,068,032	2,618,938,265	2,849,522,286	3,085,207,803	3,140,273,917	3,093,348,965

SOURCE: State Revenue Department

First of all, taxable gasoline and taxable diesel are combined. Some approach must be developed which can adequately separate the two. Officials at the State Department of Revenue estimate that about 91 percent of total taxable fuel (as shown in Table XXII is gasoline with the remaining nine (9) percent being diesel.

Assuming this ratio is correct, gasoline consumption for the state and substate area is computed and shown in Table XXIII. This ratio is an estimate and also was given as a statewide estimate, although the Department of Revenue spokesman felt that it would also be a legitimate estimate of the ratio at the substate level. The validity of these assumptions should be tested before the data is further used to obtain ratios and relationships to various economic indicators.

Secondly, these quantities of gasoline, as shown in both Tables XXII and XXIII, do not include gasoline which is purchased by the Federal Government. This, however, would represent a very minute percentage of the substate total and, therefore, should not be considered a problem. (Farmers also receive a tax concession with regard to gasoline, and the reader may wonder if this gasoline is included. State Revenue Department Officials indicate that the figures do include sales to the farmers).

Table XXIV shows the total taxable diesel which also is derived from the nine (9) percent ratio estimate provided by the State Revenue Department.

Thirdly, much of the diesel consumed in the state and substate area is not taxable. Typical uses of non-taxable diesel include farm consumption, power companies, home heating fuels, industrial use of fuels for heating and processing, etc.

Again, State Department of Revenue Officials estimate that about 87 percent of the diesel used in the state is non-taxable. Consequently, Table XXV shows total diesel consumed for the state and substate area. As was the case with other ratios estimated by the State Revenue Department, the validity of the 87-13 percentage should be verified at the state level, and, more particularly, at the

TABLE XXIII
GASOLINE CONSUMED IN
SOUTHWEST GEORGIA FOR SELECTED YEARS
(Gallons)

County	7-01-68 6-30-69	7-01-69 6-30-70	7-01-70 6-30-71	7-01-71 6-30-72	7-01-72 6-30-73	7-01-73 6-30-74	7-01-74 6-30-75
Baker	1,466,098	1,382,253	1,812,809	1,873,058	1,878,056	1,922,557	1,689,073
Calhoun	3,183,962	3,164,221	3,084,788	3,618,525	3,893,014	3,563,510	3,657,286
Colquitt	15,322,702	16,748,649	16,680,153	16,823,740	18,568,793	18,314,344	17,929,553
Decatur	11,633,450	13,025,368	14,631,838	16,024,487	14,926,205	14,992,411	16,893,269
Dougherty	35,091,934	39,075,119	42,901,072	46,327,577	50,006,038	51,692,977	49,668,296
Early	4,626,404	5,032,179	5,369,925	6,543,891	6,007,784	6,678,465	7,010,027
Grady	5,665,543	5,861,479	6,376,455	6,711,715	7,212,701	7,971,701	8,035,081
Lee	1,618,708	2,158,511	2,036,253	2,234,305	2,391,110	2,499,266	2,459,503
Miller	4,079,462	4,638,762	5,233,011	4,835,864	4,725,879	4,626,744	5,021,665
Mitchell	7,940,386	7,982,992	8,351,762	8,600,470	9,392,525	9,675,652	9,224,794
Seminole	4,024,180	4,337,106	4,741,515	5,058,569	5,456,887	6,284,222	6,084,425
Terrell	4,690,853	5,012,027	5,302,858	5,727,615	6,280,280	6,062,595	6,266,377
Thomas	15,710,694	16,446,022	16,981,096	17,783,519	18,419,160	19,230,714	18,856,648
Worth	8,802,914	8,923,459	7,286,813	7,703,517	8,098,239	7,728,826	6,834,687
Total	123,857,289	133,788,148	140,790,347	149,866,850	157,256,670	161,243,984	159,630,684
State	2,067,432,953	2,227,741,909	2,383,233,821	2,593,065,280	2,807,539,101	2,857,649,264	2,814,947,558

SOURCE: Derived from State Revenue Department Data

TABLE XXIV
TAXABLE DIESEL CONSUMED IN
SOUTHWEST GEORGIA FOR SELECTED YEARS
(Gallons)

County	7-01-68 6-30-69	7-01-69 6-30-70	7-01-70 6-30-71	7-01-71 6-30-72	7-01-72 6-30-73	7-01-73 6-30-74	7-01-74 6-30-75
Baker	144,999	136,706	179,289	185,247	185.742	190,143	167,051
Calhoun	314,897	312,945	305,089	357,876	385,023	352,435	361,710
Colquitt	1,515,432	1,656,460	1,649,686	1,663,886	1,836,474	1,811,309	1,773,253
Decatur	1,150,561	1,288,223	1,447,105	1,584,839	1,476,218	1,482,766	1,670,763
Dougherty	3,470,631	3,864,572	4,242,963	4,581,848	4,945,652	5,112,492	4,912,249
Early	457,556	497,688	531,091	647,198	594,176	660,508	693,299
Grady	560,328	579,707	630,638	663,796	713,344	788,410	794,678
Lee	160,092	214,479	201,388	220,975	236,483	247,180	243,248
Miller	403,463	458,779	517,550	478,272	467,395	457,590	496,648
Mitchell	785,313	789,527	825,998	850,596	928,931	956,933	912,342
Seminole	397,996	428,945	468,941	500,298	539,692	621,516	601,756
Terrell	463,930	495,695	524,458	566,467	621,127	599,597	619,752
Thomas	1,553,805	1,626,530	1,679,449	1,758,810	1,821,675	1,901,939	1,864,943
Worth	870,618	882,540	720,674	761,886	800,925	764,389	675,958
Total	12,249,622	13,231,795	13,924,320	14,821,996	15,552,858	15,947,207	15,787,650
State	204,471,391	220,326,123	235,704,444	256,457,006	277,668,702	282,624,653	278,401,407

SOURCE: Derived from State Revenue Department Data.

TABLE XXV
TOTAL DIESEL CONSUMED IN
SOUTHWEST GEORGIA FOR SELECTED YEARS
(Gallons)

County	7-01-68 6-30-69	7-01-69 6-30-70	7-01-70 6-30-71	7-01-71 6-30-72	7-01-72 6-30-73	7-01-73 6-30-74	7-01-74 6-30-75
Baker	1,115,377	1,051,585	1,379,146	1,424,977	1,428,785	1,462,638	1,285,008
Calhoun	2,422,285	2,407,269	2,346,838	2,752,892	2,961,715	2,711,038	2,782,385
Colquitt	11,657,169	12,742,000	12,689,892	12,799,123	14,126,723	13,933,146	13,640,408
Decatur	8,850,469	9,909,408	11,131,577	12,191,069	11,355,523	11,405,892	12,852,023
Dougherty	26,697,162	29,727,477	32,638,177	35,244,985	38,043,477	39,326,862	37,786,531
Early	3,519,662	3,828,369	4,085,315	4,978,446	4,570,585	5,080,831	5,333,069
Grady	4,310,215	4,459,285	4,851,062	5,106,123	5,487,262	6,064,692	6,112,908
Lee	1,231,477	1,649,838	1,549,138	1,699,808	1,819,100	1,901,385	1,871,138
Miller	3,103,562	3,529,069	3,981,154	3,679,015	3,595,346	3,519,923	3,820,369
Mitchell	6,040,869	6,073,285	6,353,831	6,543,046	7,145,623	7,361,023	7,018,015
Seminole	3,061,508	3,299,577	3,607,238	3,848,446	4,151,477	4,780,892	4,628,892
Terrell	3,568,692	3,813,038	4,034,292	4,357,438	4,777,900	4,612,285	4,767,323
Thomas	11,952,346	12,511,769	12,918,838	13,529,308	14,012,885	14,630,300	14,345,715
Worth	6,697,062	6,788,769	5,543,646	5,860,662	6,160,962	5,879,915	5,199,677
Total[1]	94,227,862	101,783,038	107,110,154	114,015,354	119,637,369	122,670,823	121,443,462
State	1,572,856,854	1,694,816,331	1,813,11,108	1,972,746,200	2,135,913,092	2,174,035,792	2,141,549,285

[1]Total may not add due to rounding.
SOURCE: Derived from State Revenue Department Data.

substate level.

Chart XXVII presents in chart form essentially the same data reflected in Tables XXIII, XXIV, and XXV. The chart does, however, provide a rather crude projection of gasoline and diesel consumption up to 1984/85. These projections, first of all, assume that the historical data is correct; although, as already mentioned, there is a possibility that the data are erroneous.

The projections are based on trends established between the years 1968/1969 and 1973/1974 prior to the main impact of the energy crisis. The 1974/1975 consumption figures were excluded in making the projections. Consequently, the chart essentially shows what demand would have been had there not been a crisis. By contrast, the shaded area shows the difference in normal projected demand and the projected demand if consumption planes out at 1974/1975 levels. Hence, this difference is not really a shortage, as indicated on the chart, but rather simply shows projections based on two different assumptions.

In addition to the need for further verification of the data, in the manner mentioned above, motor vehicle registration and related data can be used to "cross check" consumption data.

Chart XXVIII shows total motor vehicle registration for the substate area for the years 1965 through 1974. The annual average number of gallons of fuel per vehicle, as published in the U. S. Statisitical Abstract, was applied to these registration figures for the years 1965 through 1971. While there are some differences in Chart XXVIII as compared with Chart XXVII, the consumption levels are fairly close. However, consumption as reported by the State Department of Revenue appears to be consistently a bit higher than when the national gallonage factor is applied to motor vehicle registrations.

One possible explanation which deserves some further consideration is the fact that more gallons per vehicle per year are consumed in rural areas such as the substate area; and, therefore, allocations in emergency situations perhaps should be adjusted upward. Farmers contribute to this since they must frequently

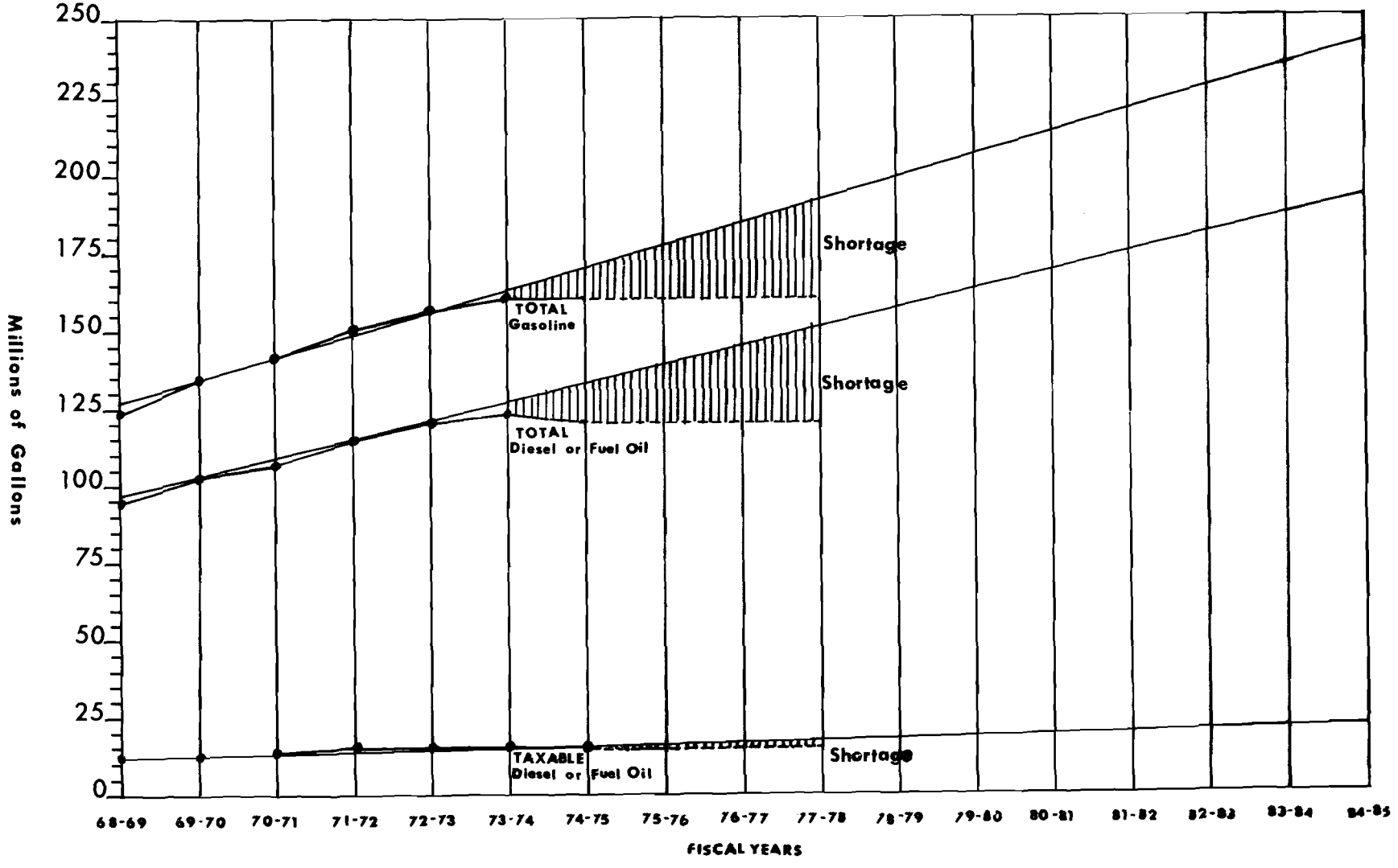
CHART XXVII

FUEL CONSUMPTION (Gasoline & Diesel)

In 14 County S.W. Ga. Area fy. 1968-69 - fy. 1974-75

With Demand Projections to fy. 1984-85

(Millions of gallons)

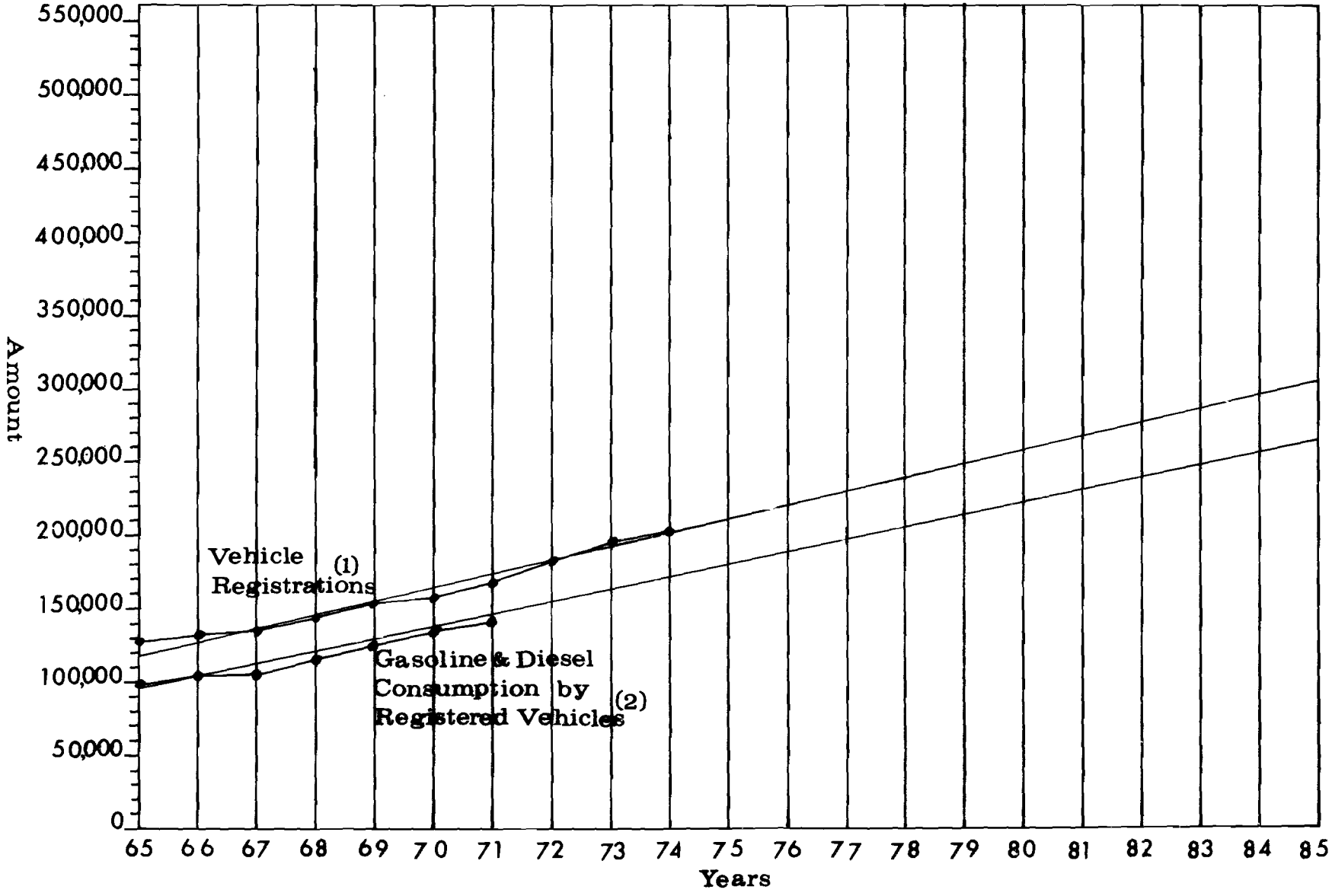


SOURCE: Derived from State Dept. of Revenue Reports.

...ND DIESEL CONSUMPTION BY REGISTERED VEHICLES 1965-71

14 County Southwest Georgia Area

(Registrations in units indicated on vertical axis) (Fuel consumption in Thousands of Gallons)



(1) State Department of Revenue (Motor vehicle division)

(2) Based on National Average of 705 gallons per vehicle in 1965, 778 in '66, 786 in '67, 804 in '68, 821 in '69, 830 in '70, 838 in '71 (more recent years not available) Source: U. S. Statistical Abstract.

travel back and forth to obtain supplies and to market products, etc. In addition, there is considerable commuting over long distances in the substate area, and in many cases, jobs are so dispersed that car pools cannot be as effective as they are in the more concentrated urban areas.

Tables XXVI, XXVII and XXVIII provide further base data regarding total passenger car and truck registration in the substate area. Further analysis of these tables might provide additional insight into consumption patterns.

The preceding pages relating to consumption and demand for gasoline and diesel approached the problem primarily from the standpoint of total consumption for all sectors.

A comprehensive demand analysis should provide the framework for estimating consumption by sectors.

As an example of the approach that could be used in analyzing consumption by sector, the following data as pertains to the agricultural sector is presented.

According to the University of Georgia Extension Service, the following amounts of diesel and gasoline are required to produce one acre of the following crops.

GASOLINE AND DIESEL REQUIREMENTS PER ACRE FOR
FOR PRODUCTION AND MARKETING OF VARIOUS SOUTHWEST GEORGIA CROPS

Crop	Diesel (Gallons)	Gasoline (Gallons)
Corn	12	18
Peanuts	17	25
Soybeans	11	16
Cotton	16	24
Tobacco	17	25
Bermuda for Hay	2	3
Bermuda for Grazing	1	1.5
Bahia (and other summer grazing)	1	1.5
Millet - Sorghum	1	1.5
Rye or Oats (winter grazing)	1	1.5
Wheat	1	1.5
Melons	4	6
Vegetables	6	9

Also, Tables XXIX through XXXIV show the state and substate acreages of selected crops for the years 1964 - 1974 (wheat, corn, cotton, soybeans, peanuts, tobacco).

TABLE XXVI
MOTOR VEHICLE REGISTRATION
IN SOUTHWEST GEORGIA AND GEORGIA AND THE UNITED STATES 1965-1974
(Grand Total-All Registrations)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	% Change 1965-1974	Southwest Ga. 1974 As Percent of Ga. Total
Baker	1,722	1,732	1,761	1,858	1,941	2,029	2,112	2,342	2,311	2,619	52.1	.1
Calhoun	2,552	2,637	2,707	2,746	2,830	2,857	2,902	3,041	3,198	3,374	32.2	.1
Colquitt	15,593	16,312	17,506	18,173	19,313	20,141	21,067	22,423	22,759	23,774	52.5	.7
Decatur	10,103	10,636	10,397	11,202	11,805	12,346	12,851	13,584	13,935	15,449	52.9	.4
Dougherty	37,747	39,745	39,442	42,590	46,428	48,925	52,147	55,328	56,166	57,083	51.2	1.6
Early	5,510	5,697	5,961	6,309	6,483	6,512	6,881	7,173	7,256	6,741	22.3	.2
Grady	8,547	8,808	9,073	9,535	10,029	10,338	10,919	11,466	11,742	12,667	48.2	.4
Lee	2,711	2,822	3,098	3,468	3,901	4,266	5,000	6,130	6,586	7,317	169.9	.2
Miller	3,215	3,278	3,374	3,594	3,771	3,834	3,947	3,995	4,293	4,583	42.6	.1
Mitchell	8,084	8,357	8,475	9,237	9,661	10,018	10,372	11,265	11,430	12,223	51.2	.3
Seminole	3,627	3,870	4,049	4,253	4,438	4,663	5,060	5,459	5,504	5,979	64.8	.2
Terrell	4,719	4,849	4,865	5,387	5,505	5,624	5,901	6,197	6,355	6,613	40.1	.2
Thomas	15,765	16,307	16,361	17,864	18,838	19,345	20,492	21,873	23,471	23,876	51.4	.7
Worth	7,055	7,146	7,474	8,095	8,549	9,066	9,766	10,993	10,854	12,329	74.8	.3
Total Southwest Georgia	126,950	132,196	134,543	144,311	153,492	159,964	169,417	181,269	185,860	194,627	53.3	5.5
Georgia	2,305,268	2,229,623	2,306,174	2,488,918	2,676,464	2,797,410	3,018,[illegible]	3,218,342	3,442,853	3,589,915	67.7	
U. S.	90,341,000					108,375,000		[illegible]				

SOURCE: State Department of Motor Vehicle Registration

TABLE XXVII
MOTOR VEHICLE REGISTRATION
IN SOUTHWEST GEORGIA, GEORGIA AND THE UNITED STATES 1965-1974
(Passenger Cars Only)

County	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	% Change 1965-1974	1974 as % of State of Georgia
Baker	1,126	1,128	1,166	1,219	1,286	1,361	1,407	N/A	1,582	1,593	42.4	.1
Calhoun	1,635	1,720	1,769	1,800	1,874	1,866	1,913	N/A	2,100	2,158	32.0	.1
Colquitt	11,174	11,634	12,175	12,718	13,408	13,799	14,261	N/A	15,012	15,094	35.1	.6
Decatur	6,932	7,320	7,096	7,601	7,843	8,120	8,385	N/A	9,245	9,474	36.7	.4
Dougherty	30,243	31,679	31,079	33,065	35,657	37,153	39,096	N/A	40,851	40,618	34.3	1.7
Early	3,641	3,784	3,986	4,142	4,221	4,223	4,525	N/A	4,675	4,225	16.0	.2
Grady	5,830	5,941	6,108	6,358	6,664	6,811	7,137	N/A	7,573	7,452	27.8	.3
Lee	1,818	1,917	2,039	2,264	2,529	2,737	3,185	N/A	4,199	4,225	132.4	.2
Miller	1,967	2,023	2,065	2,176	2,277	2,324	2,412	N/A	2,614	2,500	32.2	.1
Mitchell	5,478	5,678	5,664	6,144	6,426	6,612	6,820	N/A	7,599	7,497	36.9	.3
Seminole	2,324	2,491	2,568	2,700	2,800	2,904	3,156	N/A	3,368	3,424	47.3	.1
Terrell	3,245	3,326	3,288	3,616	3,689	3,787	3,946	N/A	4,251	4,152	28.0	.2
Thomas	11,376	11,628	11,774	12,844	13,412	13,652	14,389	N/A	15,875	15,277	34.3	.7
Worth	4,725	4,725	4,927	5,285	5,567	5,803	6,188	N/A	6,956	6,868	45.4	.3
Total Southwest Georgia	91,514	94,994	95,704	101,932	107,653	111,152	116,820	N/A	125,900	124,657	36.2	5.3
Georgia	1,630,401	1,697,756	1,744,126	1,872,028	1,999,558	2,080,773	2,236,619	N/A	2,358,222	2,338,958	43.5	
U. S. Total												

SOURCE: State Department of Motor Vehicle Registration

TABLE XXVIII
MOTOR VEHICLE REGISTRATION
IN SOUTHWEST GEORGIA, GEORGIA AND THE UNITED STATES 1965-1974
(Trucks Only)

County	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	% Change 1965-1974	1974 as % of State Of Georgia
Baker	506	495	497	515	540	555	587	N/A	588	686	35.6	.1
Calhoun	697	696	702	718	718	748	747	N/A	838	941	35.0	.1
Colquitt	3,551	3,689	3,861	4,131	4,356	4,626	4,845	N/A	5,657	6,066	71.0	.9
Decatur	2,421	2,490	2,426	2,614	2,810	2,974	3,062	N/A	3,626	3,855	59.2	.6
Dougherty	4,576	4,904	5,037	5,569	6,159	6,577	7,069	N/A	8,792	9,380	105.0	1.4
Early	1,444	1,469	1,469	1,627	1,663	1,685	1,726	N/A	1,962	1,882	30.3	.3
Grady	2,254	2,345	2,386	2,576	2,705	2,787	2,907	N/A	3,237	3,492	54.9	.5
Lee	727	737	856	908	994	1,102	1,228	N/A	1,654	1,759	142.0	.3
Miller	1,029	1,001	1,038	1,116	1,133	1,153	1,159	N/A	1,344	1,504	46.2	.2
Mitchell	2,058	2,119	2,150	2,407	2,475	2,588	2,644	N/A	2,871	3,089	50.1	.5
Seminole	923	1,002	1,065	1,103	1,144	1,206	1,300	N/A	1,504	1,620	75.5	.2
Terrell	1,147	1,162	1,176	1,275	1,294	1,321	1,386	N/A	1,579	1,710	49.1	.3
Thomas	3,207	3,315	3,309	3,677	3,877	4,003	4,207	N/A	5,194	5,431	69.3	.8
Worth	2,034	2,071	2,144	2,298	2,380	2,550	2,700	N/A	3,092	3,326	64.0	.5
Total Southwest Georgia	26,574	27,495	28,116	30,534	32,248	33,875	35,567	N/A	41,938	44,741	68.4	6.8
Georgia	352,880	374,603	389,107	428,265	462,631	490,823	523,930	N/A	607,931	659,201	87.0	
U. S. Total												

SOURCE: State Department of Motor Vehicle Registration

TABLE XXIX
WHEAT ACREAGE AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	200	390	110	160	1,170	350	430	270	220	70	210	50	390	1,080	5,100
1965	170	320	100	140	950	280	390	250	180	50	180	50	340	900	4,300
1966	200	370	100	160	1,100	320	450	290	210	60	210	60	390	890	4,810
1967	720	630	150	380	2,310	1,630	960	720	960	220	770	650	1,140	1,670	12,910
1968	550	500	150	550	1,660	1,320	940	720	770	220	550	440	770	1,320	10,460
1969	280	280	---	650	850	530	810	450	460	150	140	230	200	720	5,750
1970	1,730	940	230	1,870	680	2,250	1,500	380	2,250	190	2,020	680	680	1,170	16,570
1971	4,650	2,510	640	5,400	1,040	6,940	3,590	570	6,700	330	7,360	1,540	1,600	2,780	45,650
1972	3,230	1,840	3,800	2,270	870	4,520	830	1,880	930	2,190	1,650	2,460	1,450	2,980	30,900
1973	890	810	2,070	2,030	610	2,450	550	920	640	1,920	2,020	2,120	780	1,830	19,640
1974	670	1,530	280	1,570	650	2,400	540	1,290	1,490	740	2,530	2,380	400	740	17,210

1974 State Total - 160,000 acres

SOURCE: Georgia Statistical Reporting Service

1.5 galons diesel per acre
1.5 gallons gas per acre
Southwest Georgia - 1974 - diesel - 25,815 gallons
Southwest Georgia - 1974 - Gas - 25,815 gallons

State - 1974 - diesel - 240,000 gallons
State - 1974 - gas - 240,000 gallons

TABLE XXX
CORN ACREAGES AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
PLANTED ACRES

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	16,400	14,100	53,500	47,300	11,500	31,800	41,900	13,900	31,800	44,300	20,700	18,200	44,000	36,600	[illegible]
1965	16,300	14,100	53,400	43,300	11,460	31,700	41,600	15,740	31,500	43,900	20,750	18,390	43,800	36,250	422,190
1966	16,000	13,800	53,300	43,300	11,400	31,200	40,700	15,000	30,900	42,900	20,400	17,900	42,900	36,400	416,100
1967	17,700	15,300	60,100	43,700	12,500	34,400	44,900	18,700	34,000	47,200	22,400	19,700	47,200	41,000	458,800
1968	17,400	15,000	58,700	42,200	12,200	35,200	45,700	16,800	34,300	47,700	23,100	19,200	47,500	40,100	455,100
1969	20,100	18,000	56,600	35,700	12,100	33,100	46,000	18,100	35,000	50,800	22,000	20,100	44,200	47,200	459,000
1970	18,700	15,950	58,200	37,400	11,300	32,400	41,200	15,900	33,500	48,700	21,200	20,800	43,200	48,600	447,050
1971	20,400	10,000	47,200	38,900	8,100	32,200	46,700	18,200	27,400	53,000	19,400	22,400	46,000	36,500	426,400
1972	18,300	9,650	42,400	37,700	7,200	28,800	40,100	15,400	24,700	47,800	17,500	20,100	40,900	32,800	383,350
1973	20,800	14,100	54,800	41,000	7,500	38,800	47,200	21,800	31,900	52,500	21,500	25,700	42,000	47,500	467,100
1974	23,900	14,200	59,500	43,200	9,600	38,900	50,200	28,500	34,000	55,300	21,200	26,700	48,000	53,000	506,200

State Total 1974 - 2,000,000 acres

SOURCE: Georgia Statistical Reporting Service

12 gallons diesel per acre
18 gallons gasoline per acre
Southwest Georgia - 1974 - diesel - 6,074,440 gallons
Southwest Georgia - 1974 - gas - 9,111,600 gallons

State - 1974 - diesel - 24,000,000 gallons
State - 1974 - gas - 36,000,000 gallons

TABLE XXXI
COTTON ACREAGE AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	2,790	5,000	21,660	2,240	1,790	11,120	2,910	3,240	5,800	9,860	4,080	10,540	5,160	19,540	105,730
1965	2,350	4,670	20,140	1,700	1,830	9,630	2,450	3,080	5,120	8,710	3,940	9,710	4,130	18,280	95,740
1966	1,070	3,060	12,700	1,010	1,080	6,000	1,580	1,950	2,860	5,700	2,410	6,620	2,750	9,900	58,690
1967	630	2,480	12,300	440	770	4,060	490	1,590	1,760	3,840	1,230	6,700	1,680	9,200	47,170
1968	630	3,400	18,130	670	930	5,250	2,100	2,510	2,300	6,650	1,920	7,750	3,480	12,400	68,140
1969	700	3,450	16,800	155	850	5,850	1,950	2,200	2,550	5,900	2,200	8,300	2,850	12,600	66,355
1970	600	3,600	15,800	90	750	6,150	1,450	1,800	2,800	5,000	2,300	8,150	2,500	12,300	63,290
1971	250	3,800	16,400	150	250	6,500	600	2,000	1,200	3,500	1,600	10,100	2,000	11,000	67,350
1972	620	4,900	20,700	550	550	6,000	700	2,300	1,550	5,100	1,850	11,300	2,650	12,200	70,970
1973	140	4,420	19,000	515	360	5,300	205	2,270	900	3,960	1,460	9,950	1,940	8,850	59,270
1974	220	5,650	24,900	400	1,270	6,050	155	2,670	1,040	4,330	2,220	11,400	2,670	11,500	74,475

1974 State Total = 423,000 acres

SOURCE: Georgia Statistical Reporting Service

16 gallons diesel per acre
24 gallons gasoline per acre

Southwest Georgia - 1974 - diesel - 1,191,600 gallons
Southwest Georgia - 1974 - gas - 1,787,400 gallons

State - 1974 - diesel - 6,768,000 gallons
State - 1974 - gas - 10,152,000 gallons

TABLE XXXII
SOYBEAN ACREAGE AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total.
1964	-----	150	410	370	740	190	-----	1,510	------	220	200	260	1,370	860	6,280
1965	130	200	550	500	990	250	-----	2,030	------	1,290	270	350	1,850	1,160	9,570
1966	480	820	1,890	730	2,880	360	-----	2,930	2,000	1,880	650	1,000	2,670	3,590	21,910
1967	1,700	3,000	4,900	3,000	3,500	2,600	-----	5,800	1,800	3,000	1,600	3,000	6,800	5,000	45,600
1968	1,300	2,300	2,800	1,800	1,800	1,900	-----	4,600	900	1,800	1,000	2,300	4,600	2,700	29,800
1969	1,300	1,800	1,200	950	700	1,901	-----	4,300	350	1,200	850	2,000	3,900	1,400	21,850
1970	1,100	3,400	1,600	2,000	800	2,100	-----	4,400	1,200	2,000	1,200	3,000	7,900	3,000	33,700
1971	920	4,200	2,100	3,600	1,000	2,300	-----	5,200	2,100	2,700	1,700	4,300	11,900	4,600	46,620
1972	2,000	4,000	3,400	6,700	1,200	2,200	-----	7,400	3,400	2,600	2,200	4,600	13,000	4,600	57,300
1973															
1974	3,200	6,600	6,200	9,800	3,250	6,800	6,900	10,000	5,250	4,000	6,350	8,900	22,850	4,300	104,400

1974 State Total - 1,010,000 acres.

SOURCE: Georgia Statistical Reporting Service

11 gallons diesel per acre
16 gallons gasoline per acre

Southwest Georgia - 1974 - diesel - 1,148,400 gallons
gas - 1,670,400 gallons

State - 1974 - diesel - 11,110,000 gallons
gas - 16,160,000 gallons

TABLE XXXIII
PEANUT ACREAGE AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	14,450	15,980	9,705	16,350	6,020	31,510	8,495	14,975	19,870	20,400	12,285	20,495	4,655	28,820	224,010
1965	14,050	16,435	9,865	16,575	6,085	31,740	8,600	15,090	20,050	20,525	12,370	20,990	4,680	28,945	226,000
1966	13,740	15,055	8,550	16,475	6,135	30,710	8,630	15,020	20,040	20,570	12,385	20,870	4,700	29,515	222,395
1967	13,705	15,190	10,005	16,410	6,180	29,770	8,605	15,040	19,830	20,035	12,275	20,260	4,620	29,130	221,055
1968	14,295	15,360	9,910	16,600	6,250	30,780	8,400	15,670	19,745	20,450	12,850	21,920	4,785	29,240	226,255
1969	14,385	15,355	9,915	17,290	6,255	32,050	8,415	15,495	19,725	20,365	12,870	22,305	4,850	29,240	227,515
1970	14,270	15,375	9,740	17,490	6,220	30,965	8,435	15,540	19,870	20,480	12,900	22,715	4,880	29,510	228,390
1971	14,395	15,480	10,010	17,650	5,955	31,150	8,575	15,560	19,725	20,540	12,975	22,810	4,940	29,100	228,865
1972	14,360	15,430	10,010	17,635	5,975	31,280	8,655	15,630	19,805	20,700	12,560	22,955	4,995	29,500	229,520
1973	14,880	16,646	10,220	18,141	6,014	33,373	8,831	16,036	19,919	21,505	12,869	23,563	5,195	29,951	237,143
1974	14,722	16,672	10,273	18,214	5,997	33,587	8,814	15,992	19,826	21,493	12,776	23,597	5,267	29,704	236,934

1974 State Total - 515,868

SOURCE: Georgia Statistical Reporting Service

17 gallons diesel per acre
25 gallons gasoline per acre

Southwest Georgia - 1974 - diesel - 4,027,878 gallons
gas 5,923,350 gallons

State - 1974 - diesel - 8,769,756 gallons
gas - 12,896,700 gallons

TABLE XXXIV
TOBACCO ACREAGE AND PRODUCTION AND MARKETING FUEL REQUIREMENTS
SOUTHWEST GEORGIA AND STATE: 1964-1974
(Acres)

Year	Baker	Calhoun	Colquitt	Decatur	Dougherty	Early	Grady	Lee	Miller	Mitchell	Seminole	Terrell	Thomas	Worth	Total
1964	5	-------	4,790	280	20	-----	1,180	---	------	1,955	--------	-------	1,415	1,540	11,185
1965	5	-------	4,065	225	15	-----	970	---	------	1,635	--------	-------	1,150	1,300	9,365
1966	5	-------	4,800	320	20	-----	1,300	---	------	2,100	--------	-------	1,600	1,550	11,695
1967	-	-------	5,255	270	20	-----	1,235	---	------	1,900	--------	-------	1,475	1,670	11,825
1968	-	-------	4,130	255	17	-----	990	---	------	1,700	--------	-------	1,220	1,510	9,622
1969	6	-------	4,280	255	18	-----	1,090	---	------	1,870	--------	-------	1,290	1,380	10,191
1970	-	-------	4,900	220	--	-----	1,250	---	------	1,950	--------	-------	1,560	1,570	11,450
1971	-	-------	3,930	290	25	-----	1,100	---	------	1,800	--------	-------	1,290	1,440	9,875
1972	-	-------	4,440	280	16	-----	1,090	---	------	1,950	--------	-------	1,420	1,490	10,686
1973	9	-------	4,770	348	26	-----	1,287	---	------	2,106	--------	-------	1,549	1,549	11,644
1974	5	-------	6,341	448	27	-----	1,600	---	------	2,674	--------	-------	2,026	1,951	15,072

1974 State Total - 34,365

SOURCE: Georgia Statistical Reporting Service

Southwest Georgia - 1974 - 17 gallons diesel per acre x 15,072 = 256,224 gallons
25 gallons gasoline per acre x 15,072 = 376,800 gallons

State - 1974 - 17 gallons diesel per acre x 34,365 = 584,205 gallons
25 gallons gasoline per acre x 34,365 = 859,125 gallons

Acreages for other crops should also be obtained.

The per acre gasoline and diesel requirements were then applied to the 1974 acreages for the state and substate area. Further analysis of these data would show the relative importance of gasoline and diesel consumption in the substate area as well as provide a vehicle for predicting or projecting diesel and gasoline requirements for agriculture.

To the extent that these needs represent a departure from the state average or shows rather unique consumption and demand patterns, consideration should be given in terms of allocations if, and when, another petroleum shortage occurs.

Another indicator of farm consumption of gasoline and diesel could be derived by further development of Tables XXXV and XXXVI.

Table XXXV shows the number of tractors, etc. on farms in the substate area and the state for 1959, 1964 and 1969 as derived from the Census of Agriculture. Given per unit consumption and the average number of hours the equipment is in operation (This information could be estimated by University of Georgia Extension personnel or by a sample survey), consumption could be estimated from the base data.

Chart XXXVI shows fuel consumption on farms in terms of dollars for 1959, 1964 and 1969. Also, gasoline and diesel consumption is shown separately for 1964 and 1969. However, 1959 data of this type are not available.

In addition, farm consumption of L.P. gas and "other" petroleum products is shown for 1964 and 1969. Again, 1959 data were not available. These dollar figures could be converted to physical quantities by obtaining details regarding historical prices.

These are some of the considerations involved in delineating gasoline and diesel consumption for the agricultural sector. Other sectors that probably should be considered are:

TABLE XXXV

NUMBER GAS AND DIESEL POWERED UNITS OF EQUIPMENT
ON FARMS IN SOUTHWEST GEORGIA AND THE STATE: 1959, 1964, and 1969

County	Number of Tractors Other Than Garden			Number Of Wheel Tractors			Number of Crawler Tractors			Number of Garden Tractors & Motor Tillers			Self Propelled Grain And Bean Combines		
	1969	1964	1959	1969	1964	1959	1969	1964	1959	1969	1964	1959	1969	1964	1959
State	60,833	89,049		58,722	87,291		2,111	1,758		2,708	7,453	N/A	5,158	2,595	N/A
Baker	346	404	413	338	399	39[illegible]	8	5	8	4	0	N/A	45	5	N/A
Calhoun	405	453	595	393	445	5[illegible]	12	8	12	10	6	N/A	52	13	N/A
Colquitt	1,567	1,945	2,323	1,544	1,924	2,[illegible]	23	21	7	61	37	N/A	163	53	N/A
Decatur	719	1,047	1,163	684	1,014	1,11[illegible]	35	33	39	42	41	N/A	82	38	N/A
Dougherty	331	497	452	311	484	[illegible]30	20	13	7	17	35	N/A	29	18	N/A
Early	782	916	N/A	762	902	N/A	20	14	N/A	16	25	N/A	102	22	N/A
Grady	1,032	1,344	1,316	1,011	1,337	1,268	21	7	31	41	15	N/A	134	61	N/A
Lee	457	483	604	431	463	5[illegible]	26	20	18	29	27	N/A	78	27	N/A
Miller	639	696	788	619	695	766	20	1	16	66	6	N/A	88	38	N/A
Mitchell	1,066	1,370	1,407	1,035	1,364	1,36[illegible]	31	4	33	54	3	N/A	108	61	N/A
Seminole	472	464	532	463	463	52[illegible]	9	1	10	25	0	N/A	59	38	N/A
Terrell	569	863	872	552	858	8[illegible]6	17	5	10	12	18	N/A	56	42	N/A
Thomas	856	1,401	1,588	832	1,384	1,5[illegible]0	24	17	18	53	54	N/A	93	87	N/A
Worth	1,144	1,344	1,588	1,095	1,328	1,537	49	16	6	37	14	N/A	159	61	N/A
Total 14 County Area	10,385	13,227		10,070	13,060		315	165		467	281	N/A	1,248	564	N/A

SOURCE: U. S. Census of Agriculture

TABLE XXXVI

FUEL CONSUMPTION ON FARMS IN
SOUTHWEST GEORGIA AND STATE; 1959, 1964 & 1969

County	TOTAL FUEL			TOTAL GASOLINE			TOTAL DIESEL FUEL			TOTAL LP GAS, BUTANE, & PROPANE			OTHER PETROLEU FUEL AND PRODUCT		
	1969	1964	1959	1969	1964	1959	1969	1964	1959	1969	1964	1959	1969	1964	195
State	$37,802,638	$38,284,651	$31,603,930	$17,008,688	$21,909,527	N/A	$8,961,339	$4,740,088	N/A	$7,290,564	$6,005,244	N/A	$4,542,047	$5,629,792	N/A
Baker	260,671	245,612	226,027	126,786	161,543	N/A	90,298	25,091	N/A	17,614	35,449	N/A	25,973	23,529	N/A
Calhoun	345,105	315,023	290,321	133,874	150,946	N/A	150,533	107,242	N/A	27,587	26,257	N/A	33,111	30,578	N/A
Colquitt	1,183,159	1,178,347	979,483	483,927	647,763	N/A	338,418	145,798	N/A	237,968	243,680	N/A	122,846	141,106	N/A
Decatur	498,232	638,597	483,468	252,229	383,952	N/A	142,046	86,877	N/A	64,543	98,185	N/A	39,414	69,583	N/A
Dougherty	222,697	206,469	179,148	129,337	144,547	N/A	70,060	34,931	N/A	4,326	4,631	N/A	18,974	22,360	N/A
Early	567,405	580,361	544,578	248,710	293,724	N/A	186,983	98,562	N/A	64,353	116,273	N/A	67,359	71,802	N/A
Grady	619,456	589,099	517,448	291,995	352,642	N/A	166,985	56,470	N/A	105,506	118,818	N/A	54,970	61,169	N/A
Lee	295,813	293,075	312,884	126,433	173,611	N/A	128,810	77,810	N/A	11,929	7,330	N/A	28,641	3-,324	N/A
Miller	395,270	344,943	331,131	182,443	193,686	N/A	147,605	61,847	N/A	30,481	49,081	N/A	34,741	40,329	N/A
Mitchell	95,702	726,872	569,460	55,305	401,499	N/A	27,283	81,300	N/A	4,001	182,255	N/A	9,113	61,818	N/A
Seminole	299,496	255,275	277,543	131,261	175,397	N/A	116,126	34,642	N/A	24,380	20,865	N/A	27,729	24,371	N/A
Terrell	386,959	376,756	313,530	156,412	223,790	N/A	171,762	72,761	N/A	18,242	32,949	N/A	40,543	47,256	N/A
Thomas	507,141	753,981	621,885	250,165	458,009	N/A	138,140	95,647	N/A	77,781	104,795	N/A	41,055	95,530	N/A
Worth	754,501	687,536	641,306	338,333	417,859	N/A	266,714	130,507	N/A	80,857	53,938	N/A	68,597	85,232	N/A
TOTAL 14 COUNTY AREA	6,431,607	7,191,946	6,288,212	2,907,210	4,178,968	N/A	2,141,763	1,109,485	N/A	769,563	1,094,506	N/A	613,066	808,987	N/A

SOURCE: U. S. Census of Agriculture

1. Governmental and Institutional. These data could be obtained by studying the records kept by municipalities and county governments including schools, hospitals, etc. which are arms of local governments. Also, estimates could be made fairly easily in terms of institutional use, i.e. colleges and universities, state and federal offices, etc.
2. Aside from utilizing registration data already discussed previously, there appears to be no other practical approach to delineating gasoline and diesel consumption for the following sector except through sample surveys: Residential sectors, transportation sector, commercial sector, industrial sector, power companies.

In any event, all of this demand or consumption related basic data should be analyzed very carefully and thoroughly and cross checked in order that accurate consumption patterns can be presented; and consumption projected as well as quantitative identification made of unique needs.

II. SUPPLY

At the current time, there are no shortages of gasoline or diesel in the substate area. On the contrary, a considerable surplus exists, which is not conducive to creating interest in conservation and management except the natural individual reaction or response to high gasoline prices. With regard to these prices, the general public is still convinced that the major oil companies have used the energy crisis as an excuse to raise prices excessively. In view of the existing surpluses, it is easy to understand this attitude. However, it appears to be more than the existing surpluses. The public apparently has a general distrust of government and big business. This attitude is more pronounced with regard to gasoline, etc. than it is with regard to utility-oriented energy.

According to task force members who are in the gasoline and diesel industry, the supply situation boils down to the following: with the exception of item six

(the embargo) these factors represent a reduction in demand rather than being supply oriented. However, they do contribute or affect the surplus and, consequently, are relevant to the demand/supply relationship.

Surpluses exist due to the fact that current consumption of diesel and gasoline is down due to:

1. Stagnant economy and related factors
2. Increased use of smaller cars, etc.
3. Legislation such as reduced speed limits
4. Price response
5. Some patriotic response (conservation)
6. Embargo lifted

Chart XXVII in the demand section does, in fact, show decreased consumption. This has contributed to the surplus supply. If the economy improves, the surplus would diminish to some extent.

The major problem or "straw that broke the camel's back" was the embargo. Task force members feel that gasoline and diesel will be in plentiful supply at some price unless there is another embargo prior to the time that the oil industry can gear up to produce and refine more domestic oil. The task force members simply do not buy the fact that we will have a perpetual problem with gasoline and diesel, say over the next 20 - 25 years or longer, such as is predicted by some. Rather, it is viewed as an adjustment problem.

Basically, any discussion of total supply at the substate level is academic as well as opinionated. It should suffice to say that the substate plan simply:

A. Be designed to insure that the area receives equitable allocation if another crisis occurs. (unique needs, etc.)

B. Have developed the statistical tools to adequately measure consumption, impact of shortages, etc. and, otherwise, be prepared for the possibility of a shortage in the event it occurs.

C. Recognize and accept the basic fact that people, individually, are not going to conserve for conservation's sake when a surplus exists, expecially,

when they feel as they do about the oil companies and governments.

While the discussion of total supply (or speculation regarding probability of another shortage) is academic, it is appropriate to discuss substate or allocation problems as experienced during the energy crisis as well as some of the problems encountered currently with the surplus conditions.

In this regard, questionnaires were mailed to a large number of service station operators in the substate area. Among the questions included in the survey were questions relating to supplies during the energy crisis in terms of equitable allocation, the extent of shortages, etc.

By and large, the operators were generally satisfied that supplies were equitably allocated during the crisis. However, there were some incidences where the "neighborhood" service stations were in short supply while stations on tourist-oriented highways had excess supplies. Independent stations also complained that they had to pay more than the majors.

There was also some indication of concern relative to the problem of "company takeover of stations". Some of the franchised operations felt that company-operated stations or the threat of company-operated stations as opposed to "franchised" stations was a problem during the crisis and continues to be a problem during the surplus situation.

The results of the survey of individual stations were not conclusive. There were some conflicting statements which seem to indicate frustration and lack of understanding, as well as some human frailties such as lack of education and, of course, the self-interest motive. For example, when the operators were questioned in regard to the appropriate role of government in allocating scarce supplies to the stations as well as their ideas on the role of government in helping them to allocate scarce supplies to the ultimate customer, the vast majority were opposed to any kind of government interference. Yet, they tended to either blame government or suggest that the majors should be forced to treat the franchised or independent

stations in a more reasonable manner which, in itself, is a type of government interference.

In short, they were simply saying that control was good if not applied directly to them.

In view of these discrepancies and inconsistencies, the gasoline retailers association was contacted to obtain a more refined and collective assessment of the supply situation as viewed by the gasoline dealers.

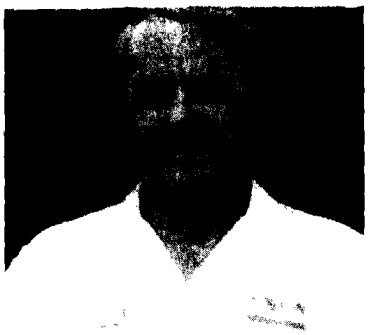
Exhibit V, which is a reprint of a copy of a letter from the Executive Director of the Georgia Gasoline Retailers Association to the Federal Energy Administration, sums up the major problems perceived by the Georgia Gasoline Retailers. While this is a statewide organization, this letter would obviously apply to the substate area. In regard to this, various bills have been proposed and submitted to Congress and to the state legislature which are aimed at correction of the alledged problems. It should be pointed out, however, that some students of the energy problem feel that more company operated stations are desirable.

Retail Gasoline Association officials were asked to comment on the problems encountered regarding allocation during the crisis. By and large, the association was pleased with the allocation process in terms of equitable treatment. There were some individual hardships but, presumably, most were resolved. Officials did point out that the sheer magnitude of the process was quite troublesome. They also felt that, since the crisis, sufficient corrective action has been taken which will insure that the process would be much smoother in the event of another crisis.

Officials were specifically asked to indicate if the base for establishing allotments was discriminating or unfair. The answer was that it was not discriminating. (1972 was the base year).

In short, the retailers association is more concerned with the problems as expressed in the letter (Exhibit V), than it is with possible future shortage since they feel that an appropriate, equitable and workable allocation system stands in readiness.

NEWS & VIEWS



W. DAVIS BARRON

EXXON DEALER—ATLANTA

PRESIDENT—GAPR

Here Is A Copy Of A Letter - Demanding Relief For You:

Mr. Frank Zarb, Administrator
Federal Energy Administration
U.S. Post Office Building
Washington, D.C. 20461

May 23, 1975

Dear Mr. Zarb:

The greatest threat to the independent branded and unbranded gasoline retailers' survival continues unabated. To Wit: the cross-hauling, back door, distress wholesale selling of products to some at prices that results in total destruction of the "competitive viability of competing retailers." Something must be done. Your agency can and should act immediately if the mandate by Congress is to be fully implemented.

In my testimony before FEA on April 24, 1975 offered suggestions to deal with this threat that will, if it continues much longer, eliminate or seriously cripple thousands of gasoline retailers. Such will not best serve the public interest.

This letter is to provide your agency with my logic and belief as well as specific reference to that language in portions of present regulations and/or law that does provide enabling action on your part to swiftly correct certain practices directly related to causation of the gasoline dealers dilemma.

In the FEA Ruling 1975-2 discussion of general principles with factual examples it clearly explains FEA's right "*...to maintain a single lawful price for product to all customers that fall into a particular class...*" and "*...to maintain the price differentials that existed on May 15, 1973 between groups of purchasers* which were not similarly situated then and are not now similarly situated..." and "*...price differentials between different purchasers* which tend substantially to lessen competition *are consistent with the Robinson-Patman Act* if they (1) are cost justified; or (2) are necessary in good faith to meet competition ...". (Italics added)

Since it is the mandate of Congress to preserve the competitive viability of *all* retailers, whether independent branded or unbranded, during the period of time that controls are in force ... *it is essential that differentials between classes of purchasers be maintained.* If FEA can, as it is doing, prohibit differentials among members of the same class of purchasers then FEA has the power and is mandated by The Congress to prohibit differentials in excess of differentials at May 15,1973 between the various classes of purchasers. This would be consistent with the purpose and intent of Congress to keep all parties "in place" competitively during Federal Control of marketing. To allow differentials between classes of purchasers to increase from a 3¢ differential to 6¢, 8¢, or more is to allow one class of purchasers to be unfairly favored and thus permit a big shift in market share to that class of purchers; to the detriment of other classes of purchasers.

Sales of product must be restricted to each class of purchasers historically served at prices which are historically relatively calculated if the competitive viability of *all* dealers is to be assured.

Product continues to move from one major branded wholesaler to another branded wholesaler and/or to the individual retailers. Texaco and Gulf marked trucks have been reportedly dropping gasoline in a Fina station and an unbranded station. Wholesalers reportedly are selling product at ½¢ a gallon over their wholesale price just to move product which the Big Oil Companies insist they sell (or risk loss of future volume commitments).

Supplier "take-over" of retail outlets (both jobber and major oil companies) continues to effectively move toward elimination of the small businessman --- and to effectively shift the market share of the independent branded and unbranded to the suppliers company operated outlets.

Continued delay to deal with these serious issues is compounding the problems of dealers.

On behalf of our almost 3,000 gasoline dealer members and the 200,000 dealers across America I urge you to:

(1) Stop differentials between classes of purchasers in excess of differentials that existed at May 15, 1973; and

(2) Stop cross-hauling and back door distress sales of product unless such sales are offered at the same price to all classes of purchasers served by the wholesaler refiner; and

(3) Stop supplier "take-over" of retail outlets which is shifting more market shares to suppliers; and

(4) Restore the balance needed for maxium competitive viability for all gasoline.

Consumers will benefit from your action to assure equity and fairness for all during the continuation of controls on our industry. Then when we do return to a position where controls are no longer necessary each will have a fighting competitive chance beginning from an "in place" position held at the time controls were imposed.

Thank you for your effort to deal with these real and urgent needs.

Sincerely,

Jack W. Houston
Executive Director

JWH/vs
cc:
Georgia Congressional Delegation
National Congress of Petroleum Retailers
Board of Directors of GAPR

Since the allocations are made individually to wholesalers and retailers based on historical sales, it appears that the substate area as an entity has little role to play in the allocation process.

This is an appropriate point to address a frequently mentioned problem expressed by the consumer or consumer groups. It is generally felt that those who seriously practice conservation measures will somehow be penalized for their efforts if and when another crisis occurs. They fear that the base for allocation would be changed which would reduce future allocation.

Retail Gasoline Association officials indicate that the 1972 base is firmly fixed, and they are not concerned with this possibility.

It does appear that these fears are unfounded. For example, the ultimate consumer whether it is an individual, a company or a local government or institution, has never been on an allotment system; and, certainly, no one knows their usage. Consequently, under the allocation system, as practiced during the crisis, there is no way that the consumer could lose an allocation that never existed.

III. IMPACT ANALYSIS

It is difficult to discuss, with any degree of confidence, the impact of the uncertainties with regard to gasoline and diesel. First, it is uncertain that we will have another crisis. This depends on our import situation. Secondly, there is not way to predict the severity of a possible shortage. Even if one could predict the severity, then it is most difficult to measure impact. Thirdly, as has been mentioned previously, the present "surplus" situation is having an impact, or will have a potential impact, on the marketing structure according to the Georgia Gasoline Retailers Association. Certainly, price alone is have an impact. There is simply no way to address the impact in a systematic and meaningful manner without making arbitrary assumptions.

1. Price Impact - Needless to say, prices in the last couple of years, current prices, and expected future prices have had, and will have, a tremendous and detrimental impact on all sectors in Southwest Georgia.

This is definately a problem. It would be nice if someone had some answers. As stated in the section dealing with other energy sources, energy pricing is just one of many inflation-oriented problems. As such, it is causing local governments problems, as well as every business and individual. Again, there are some poor people who are, no doubt, affected more than others. The question of giving special pricing considerations to such groups is strictly a social welfare problem rather than an energy management/conservation problem.

2. Impact of uncontrolled takeover of retail outlets by large wholesalers and major oil companies - If the problem exists in the proportion indicated by the Georgia Gasoline Retailers Association, the impact, would, over the long run, be very detrimental, according to some people, in:
   (a) Diminished price competition
   (b) Diminished Services
3. Impact of a relatively significant shortage - It appears that consumption in the substate area has already been reduced to almost minimum levels by the lower and middle income groups. The upper income groups have not been seriously affected. In short, consumers have cut back as far as they can and still remain generally within existing life styles. Certainly, consumption could be reduced further if life styles are changed. Pricewise, it will take $1.00/gallon gas or more or either mandatory laws, policies, etc. to effectuate these life style changes or either some type of incentive program.

Employment, unemployment, retail sales or any other economic indicator will reflect the results or reduced consumption and, as such, will impact on the economy.

IV. SPECIFIC MANAGEMENT AND CONSERVATION PRACTICES

Obviously, short of legislation and pricing, there is nothing one can do in

the private sector to reduce consumption except by promoting conservation on a voluntary basis as already is being done.

In the field of legislation (either local, state or federal) one naturally thinks of items such as maintaining or further reducing speed limit and requiring automobile manufacturers to build automobiles - which will give better gas milage, or other such possibilities.

In the government and institutional sector there is a "potential" for "self-imposed" conservation. In particular, some conservation could be achieved through better fleet management. Basically, fleet management includes a wide range of activities including actual operation of vehicles, vehicle maintenance, selectivity in replacement units, vehicle modification, good record keeping system, more efficient routing and just plain cutting out unnecessary trips. These are all simply good management practices that should be used regardless of fuel supplies.

With regard to the details of fleet management and fuel saving tips, there is an abundance of brochures in print from various agencies.

The problem is not how to save on fuel consumption but, rather, the willingness to practive the measures. Again, the motivating factor will be budgets. If local governmental budgets are tight, they will use less fuel. If more funds are available, there will be increased consumption. Again, it boils down to forced allocation or some type incentive program.

V. SUMMARY OF RECOMMENDED APPROACH

It appears that with regard to gasoline and diesel conservation and management the substate role is primarily one of setting up mechanisms or models for measuring past consumption, making projections and relating use to various indicators, etc.

Beyond this, there appears to be one or two areas in which substate planners could provide input. The first would be fleet management training and/or technical assistance for local governments and some of the larger private companies. This would require both funds and manpower on a continuing basis.

The other would be one of promoting conservation through a formalized program in the area, and it would include presentations to civic groups, schools, etc.

L.P. GAS

I. DEMAND

L. P. gas, like gasoline and diesel, must be viewed somewhat differently from electrical energy and natural gas, since it is marketed or distributed through the private sector. In short, it presents a problem relative to availability of data.

In fact, data availability is a much more serious problem with regard to L.P. gas than it is with gasoline and some type of diesel. In the case of gasoline and taxable diesel, some information regarding consumption was available from the State Revenue Department. This is not the case with L.P. gas.

Sales of this product, by state, are available from the Mineral Industry Surveys, "Sales of Liquified Petroleum Gases and Ethane". However, this data is not available on an APDC basis.

Consequently, it appears that the only method of obtaining this information is by a combination of:

(a) Sample survey of users by residential, commercial, industrial, etc.

(b) Survey of suppliers

Once reliable consumption data is obtained, use should be correlated to population, employment, etc.

II. SUPPLY

As was the case for demand, there are no estimates on a substate basis. Task force members, as well as most suppliers, indicate that supplies are presently fairly adequate. There are a number of suppliers in the substate area who are advertising for additional sales. This seems to indicate that the supply is not too critical.

However, others indicate some shortages.and are particularly concerned about lack of adequate storage capacity and transportation facilities (mainly pipelines).

Appendix B

SUBSTATE ENERGY MANAGEMENT IN THE ATLANTA REGION

AN ATLANTA REGIONAL COMMISSION
STAFF WORKING PAPER

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February, 1976

I. Introduction

The objectives of this paper are three-fold: 1) to identify and describe energy related problems that potentially impact the Atlanta Region, placing particular emphasis on the most pressing energy related problems that can be addressed at the substate level; 2) to suggest appropriate roles for the various levels of government in addressing the identified problems; and 3) to assess existing communications mechanisms, suggest improvements where appropriate, and help insure a more cohesive approach where multi-level intergovernmental action appears necessary.

This paper does not address some significant issues, such as the relative merits of various energy sources. It was felt that this type of question is more appropriately addressed at the national level. Additionally, the paper does not attempt to deal with efforts to insure that serious fuel shortages do not occur. Such shortages could have serious local, as well as national, social and economic impacts. While uncertainty with respect to future fuel availability must, therefore, be a component of local decision making processes, the ability to prevent such shortages is, for the most part, not available to local governments.

In identifying appropriate roles for the various levels of government, the roles for state and local governments are relatively clear. At the federal level, however, the proliferation of agencies dealing with energy issues makes it difficult to clearly define specific responsibilities. This problem has been recognized at the federal level and, as evidenced by the recent agreement between HUD and FEA, steps already have been taken to alleviate it. Confusion, however, still exists.

The report has been broadly divided into two major sections: (1) transportation and physical development; and (2) local economic activity. Many of the problems discussed are interrelated, but for the purposes of this report are placed under the category that most closely corresponds to the basic issue. It must also be recognized that the problems discussed in this paper are not new; many have been discussed and written about in far greater detail than is attempted here. Neither should the list of problems be considered to be all-inclusive. The intention is to look at energy problems from the perspective of an agency responsible for planning for the future development of a large metropolitan region. It should be recognized that perspectives will differ depending not only on the size of the area, but also on the level of government from which problems are being viewed.

This paper is oriented to what various levels of government can do to help alleviate our energy problems. It has always been recognized, however, that the voluntary action of citizens to conserve energy is a major factor in meeting our energy problems. There is a very strong need to develop an energy conservation ethic, and to recognize that natural resources are not unlimited. Energy management is an area in which everyone truly has a role. The voluntary efforts undertaken during the 1973 energy shortages give a clear indication that voluntary programs do work, and can have a positive impact. Ways must now be developed to provide the concerned citizenry with information necessary to sustain this effort even in the absence of immediately perceived crises.

II. Transportation and Development

The energy implications of many of the Atlanta Regional Commission's (ARC's) regional planning efforts are significant. The Regional Development Plan (RDP) and the Airport Systems Plan, to cite two examples, project tremendous increases in the demand for fuel (see Appendix A for transportation energy consumption associated with the RDP). These projected increases reflect the continuing function of Atlanta as the major southeastern distribution and transportation center. If, therefore, fuel availability falls significantly short of projected demand, the potential impacts could be extremely disruptive to the economy of the Atlanta Region and, also in turn, to the life styles of its citizens. Long term reliable supplies of energy are, therefore, extremely important to the economic stability and growth of the Atlanta Region. Problems and issues that must be addressed if energy implications of long range development planning are to receive the proper emphasis are discussed below. In those cases dealing with transportation policy formulation and patterns of regional development, it is assummed that the major responsibility for addressing these problems will fall upon the metropolitan planning agency acting as the collective representative of affected local officials.

1. In the face of uncertain and conflicting projections of fuel availability, it is extremely difficult to insure that energy receives appropriate consideration by decision makers who are presently making decisions that might not have serious energy implications for

another 10, 15, or 20 years. There is a frequently held view that American technology and ingenuity will resolve our long range energy problems before society is materially affected. In reaction to potential gasoline shortages, for example, shifts toward smaller, more efficient automobiles are already occurring; both houses of Congress have passed bills requiring 1985 automobiles to average 28 miles per gallon (a recent report indicates that new 1976 autos will average about 13 percent better fuel economy than the 1975 models--this means that in less than two years, autos are already more than halfway to the President's 1980 goal of improved automobile fuel economy); and greater emphasis is being placed on other means of propelling automobiles, such as the use of methanol, other synthetic fuels, and electrical power. It can be speculated, therefore, that while it is possible, and may even be likely, that we will not be a completely gasoline dependent society in 2000, it is by no means certain that we won't remain an automobile dependent society. The massive national economic investment associated with vehicular movement tends to support this supposition. The consequence is that energy does not, perhaps, receive the consideration it merits in local decision making processes that frequently have significant long-term energy

implications. Realistic energy availability constraints are needed by planning agencies as input into their planning processes.

It is clear that the responsibility for taking energy implications into account in the making of long term land use decisions rests on the shoulders of local officials. With respect to transportation related projects, local governments normally make the policy decisions, but the state generally is the implementor, and the federal government the financier. This makes it essential that officials at all levels have access to better information than is presently available. It is felt that information on long term fuel availability must come eventually from the federal government. However, controversies over issues such as oil-shade development, off-shore leasing, and foreign import policies, make it unlikely that useable information will be available in the near future. Consequently, detailed analyses of energy implications of development decisions are likely to remain an ineffective exercise at the local level--either being ignored completely, or receiving only minor consideration because of the lack of reliable information. The only way of circumventing this situation would appear to be something like a state required energy impact assessment for certain types of development projects.

2. The effects of increased prices on gasoline consumption are not fully understood. The price of gasoline has increased about 60 percent over the past two years. This increase does not appear to have had a major effect on either the usage of the automobile or on automobile occupancy rates; although as stated above, the impact on improved automobile mileage efficiency has been noticeable. At what price, and under what conditions will price increases result in sufficient changes in travel patterns, or choices of travel modes? These questions need much more extensive investigation. The only information readily available in the Atlanta Region with respect to the effect of price increases on travel choice is that associated with the decrease of transit authority (MARTA) bus fares from a $.40 base fare with a $.05 transfer charge to a $.15 flat fare with free transfers in March, 1972.

> "The lower bus fares had immediate effects. In the first week of reduced fare operation, ridership increased by 18.5 percent, which was 50 percent greater than expected. Over the following months, ridership continued to grow, forcing the Authority to acquire used buses and institute service improvements in addition to those previously planned to relieve overloads. A study was undertaken by MARTA in late 1972 as part of the Atlanta Regional Transportation Planning Program to determine the effect of fare reduction on transit ridership in the Atlanta Region. The study consisted of in-depth interviews of 3700 transit riders and a parallel in-home survey of 1400 Fulton and DeKalb county residents. Survey data on transit users indicated that the fare reduction was

> more significant in attracting new riders to transit than were other service changes. The ridership for the first 12 months of operation under the reduced fare of $.15 (from March 1, 1972, to February 28, 1973) was 14.6 percent greater than the year preceding the fare reduction. Trips by new riders accounted for about 90 percent of the increase in ridership. Approximately 11,600 automobile trips in whole or in part have been removed from the streets during the peak periods. It was estimated, however, that a decrease in fare to $.25 would have achieved approximately 80 percent of the increase in ridership achieved by the fare decrease to $.15." (From "Inventory and Analysis of Atlanta Region Low and Non-Capital Transportation Improvements," October 1975; an ARC staff working paper).

Various nationwide studies are already underway to assess the impact of increased gasoline prices on urban travel behavior. In this respect, two points are important. First, the price of gasoline is only one cost factor in a decision over whether to use the automobile when another alternative is available. Parking fee policies, for example, may outweigh the cost of gasoline in making this decision. Second, the amount that the price of gasoline will rise even from year to year is difficult to predict. In long range planning, where travel behavior twenty five years into the future must be estimated, an attempt to make assumptions concerning the price of fuel and the effect of that price on travel behavior is nearly impossible to do with confidence. Federally sponsored research projects dealing with consumer behavior, and future prices

of fuel are very much needed in order for transportation planning agencies to make reliable assumptions. Plans are based on assumptions, and their reliability is directly related to the validity of those assumptions.

3. It is recognized that higher density, mixed use, cluster type development results in less energy consumption that the typical low-density spread type development found in many large metropolitan areas, including Atlanta. In general, travel which results from the unnecessary separation of origins (residential areas) and destinations or opportunities (work places, shopping areas, recreation areas, etc.) may be amenable to reduction through government influence on land use decisions. Among the factors that should be considered with this approach are the following:

   -Higher fuel prices and the threat of reduced availability of gasoline when coupled with increases in congestion and travel time would be expected to decrease the development pressure on rural land and increase the desirability of close-in areas.

   -One key in decreasing gasoline consumption is to shorten trips. Policies that encourage the development of higher density multi-use centers would be expected to decrease gasoline consumption.

Higher density along MARTA corridors, and development of outlying employment nodes with good accessibility from their surrounding areas are examples of development patterns that could be encouraged.

-The present and projected trends toward smaller or childless families might help in that this type of family generally is more attracted to higher density, urban living compared to the large-lot-suburban preferences of larger families.

A recent study sponsored by the President's Council on Environmental Quality, HUD, and EPA, titled The Costs of Sprawl documented these savings. (shown in Appendix B). The report estimated that gasoline consumption would be from 25 to 100 percent higher for any development pattern other than high density planned. It should be noted that consumption was estimated only within the community itself; energy consumption associated with commuter travel was not considered. This implies that if higher density planned communities could be tied to a transit system or located close to large employment centers, the potential energy savings could be significantly larger than those indicated in the Costs of Sprawl. Some policies and strategies developed to implement higher density mixed use development, however, appear to run counter to public desires. Witness for example, the continued predominance of

low-density single family development which still tends to represent the American dream (a recent study conducted by National Family Opnion indicates that over 90 percent of those American families who are considering buying a home still desire a single-family detached unit); citizen opposition to rezonings that would result in commercial encroachment of predominantly residential areas; and the strong movement to preserve older low-density residential areas that would otherwise be prime candidates for mixed use, high density developments. It appears that what is ultimately needed is attitudinal changes, not technical solutions. It must be recognized, however, that energy conservation, although an extremely important consideration, is only one factor upon which decisions affecting life styles should be based.

The federal government in publishing The Costs of Sprawl has completed some of the basic research on which local development decisions can be based. It is the responsibility of local government to assess this type of information and to consider it and weigh it against other factors as part of their decision making process.

4. The auto occupancy rate for peak hour work trips in the Atlanta Region is presently about 1.1 persons per auto. The consequence of this is conges-

tion and corresponding high energy consumption associated with low-speed travel. This pattern is expected to continue into the future unless positive steps for increasing auto occupancy rates are developed. Incentives to encourage carpooling, such as preferential lane treatment, and reduced parking fees based on vehicular occupancy are ideas that are as yet largely untested. Transportation policies developed on the premise that there will be higher auto occupancy rates, are therefore, similar to any comparable policies that rely heavily on voluntary compliance--unpredictable and unreliable.

Appendix C. contains a summary of carpooling efforts that have occurred within the Atlanta Region, and analyzes some of the impacts that carpooling might have. The work was financed in part through funds provided through the Integrated Grant Administration Program of the United States Government and in part by funds provided by the Georgia Department of Transportation. It appears obvious from this work that initiatives taken on car pooling must be a combined public/private effort, with the major responsibility on local business and governmental officials. The main assistance from the State should be in investigating the feasibility of carpooling in the Atlanta Region, such as implementation

of a project similar to the Shirley Highway reversible lane for high occupancy vehicles, which is presently being employed in the Washington, D.C. metropolitan area.

5. Bicycles have frequently been mentioned as an alternative to the automobile for short or medium distance trips. Unfortunately, use of this mode in areas that have been urbanized, without special provisions being made for the bicycle, is frequently unsafe and not very comfortable. To make the bicycle a viable transportation alternative would probably require special lanes or rights-of-way, which could not be utilized by other vehicular traffic. In congested urbanized areas implementing such programs presents special problems which have not as yet been adequately resolved.

   In light of the established recreational capability of bicycles, their potential commuter function, and growing concern about impacts of transportation on the environment and energy resources, the increased use of bicycles was supported in the RDP adopted by the Atlanta Regional Commission. Specifically, the following should be considered by both state and local implementing agencies:

   a. Penetrator Systems which provide facilities leading into concentrations of high employment

or other high-use areas such as shopping centers and universities.

b. Internal Systems within areas such as parks or universities which would provide an efficient, low-cost transportation alternative with low storage area requirements.

c. Environmental Linear Corridors which would allow total separation of bikes from motorized transportation, particularly utilizing stream valleys where very desirable flat gradients encourage bicycle use.

d. New Land Developments provide the opportunity for separate but low-cost bicycle facilities and may be encouraged through incentives built into local ordinances for private developers who build such bike paths.

e. Transportation Linear Corridors could accommodate bicycles by providing space during initial design and construction. These corridors may include freeways, parkways, major arterials or transit lines.

f. Recreational Loops on low-volume streets, properly signed, to provide a variety of experience for the bicyclist.

g. Barrier Removal includes provision of access across major barriers such as streams, freeways or transit and railroad lines.

h. Storage Facilities could be mandatory in public and private buildings such as schools, libraries, transit stations, office buildings or stores and shopping centers.

6. Transit is frequently mentioned as an energy efficient alternative to the automobile. In fact, an analysis of projected energy consumption per passenger trip in the year 2000, shows the tremendous potential energy savings associated with transit ridership.

Estimated Expenditure of BTU's per Passenger Trip in 2000

Bus	- 8.97
Rail	- 18.97
Auto	- 94.96

Atlanta has recently made significant strides in the development of a major transit system. Even after implementation of such a system, however, automobile related energy consumption is projected to increase dramatically as transit will only meet a small portion of the total transportation needs. As shown in Appendix A, for example, only approximately 4 percent of projected transportation related energy

consumption can be related to mass transit systems. This appears to indicate that if energy consumption is to be reduced significantly, other policies beyond simply a modal emphasis will have to be implemented. The objective would be to reduce both the number of automobile trips and the length of such trips. Developing and implementing such policies, however, apparently runs counter to some public attitudes as discussed briefly in Section 3.

Efforts to shift patronage to transit by making it more attractive are both a state and local responsibility. Policies and programs which encourage transit ridership are responsive not only to energy considerations but also would tend to decrease congestion and air pollution. Among the means available for achieving this shift that are being analyzed in much greater detail in ARC's series of studies on low and non-capital transportation studies, and in MARTA's planning efforts are:

-Increasing the efficiency and attractiveness of transit through such measures as: an increased level of service, low fares, maintaining attractive and comfortable vehicles, and the provision of exclusive bus lanes.

-Increasing the urban operating costs of automobiles primarily through raising parking fees.

This is likely to occur naturally as part of normal market operations, as the demand for downtown spaces begins to exceed the supply. It has been argued, however, that some form of tax on downtown parking is justified when the use of the automobile is examined in the context of its total impact with respect to congestion, air quality, safety, and energy consumption.

-Using fringe parking facilities for encouraging transit service as a means of conserving energy. Unfortunately, fringe parking is practical only where very efficient transit service is available. Inherent problems of personal safety, discomfort in inclement weather, and loss of commuting time in transferring between modes are difficult to overcome. MARTA has developed three parking facilities in the vicinity of the perimeter highway, but the availability of large tracts for closer-in facilities is questionable. Additionally, neighborhood opposition to such traffic concentrators may be substantial. There are also some questions about the net energy efficiency (and pollution) of warming up an automobile just to get to the transit line.

7. There are many measures that could be employed to improve traffic flow, thereby decreasing congestion and improving gasoline consumption. Among these are reversible lanes, one-way streets, synchronized timing of traffic signals on major corridors, intersection improvements, strict enforcement of regulations developed to prevent motorists and trucks from double parking and blocking intersections, and staggered work hours. All of these measures are being explored in ARC's low and non-capital transportation studies. It must be recognized, however, that measures that promote smooth traffic flow of all urban vehicles also tend to counteract an energy conservation program. Although such measures prevent the waste of gasoline and the production of pollutants caused by excess idling time and increased acceleration cycles, and improve the service of urban buses, they also make driving more attractive and thus complicate any effort to shift commuters to transit. Optimizing the use of these measures is a job for transportation planners at all levels of government.

III. Problems Related to Local Economic Activity

Fuel availability for private industrial development is a nationwide problem. In Georgia, it is a problem that many Area Planning and Development Districts (APDC's) are presently grappling with. In metropolitan areas the size of Atlanta, however, there are many

other organizations dealing with this problem. Consequently, metropolitan planning agencies tend to have different orientations than do less-urbanized APDC's, concentrating on issues that impact the overall economy rather than on problems associated with specific resource shortages in narrow economic sectors. The problems and issues discussed below reflect this orientation.

1. Uncertainty over the availability of fuels used either directly by individual consumers (primarily home heating), or by business firms in their various manufacturing process affects the operational policies and business planning of many firms. Economic and employment instability will likely occur during any sustained periods during which fuel availability lags behind fuel demand. In the face of uncertainty, there is at least the possibility that such disruption will occur even without shortages, as needed decisions are delayed or deferred. A reliable method for providing estimates of future fuel availability must be found. The State Energy Office is doing significant work in this area, and it is felt that this forecasting should remain a state function. In reviewing work already produced or underway, it is our opinion that much of the information would be useful to many organizations that are currently not receiving it as a matter of course. Consequently, it is recommended that the State Energy Office's distribution lists be reviewed and revised. Repre-

sentatives of APDC's, as the representative agency of local governments, could provide valuable assistance in this effort. As in any similar operation, there is always the problem of information overkill, but it is felt that it is more advantageous for a local government or business official to decide whether a given piece of information is valuable to him, than it is for a government official who might not be that familiar with all the interests of a given organization to make that decision.

2. In the event of fuel shortages, fair and efficient fuel allocation procedures are needed. Specific areas that have to be addressed as part of any contingency planning effort are: coordination; dissemination of information; development of both mandatory and voluntary conservation strategies and incentives; and development of formulas and procedures for the distribution of unallocated fuels by fuel type, including detailed rationale for the setting of priorities within each fuel category. This was partially accomplished on an ad hoc basis during the 1973 fuel shortages. What is needed now, is a more systematic contingency plan where the critical users (hospitals, police, transit, sanitation, etc.) of each type of fuel are identified, and the rationale used in developing allocation procedures are clearly described. It is recognized that the Federal

Energy Administration (FEA) and the State Energy Office (SEO) have responsibilities in the area, and have been working on fuel allocation priority plans, and fuel curtailment plans. However, the way priorities are set, the fuels covered by certain plans, and the way plans will be initiated and implemented are not generally known. A concise document that explains the contingency planning programs and responsibilities of FEA and SEO would be a useful document for local business and governmental officials.

Given the large number of actors involved in the Atlanta Region, it is extremely difficult to communicate energy conservation techniques, or information needed for efficient energy related management, on an individual basis. What is needed is a communications network that could be utilized to disseminate information generated by individuals or agencies to local business and governmental officials, grouped according to area of interest or responsibility (transportation, manufacturing, construction related trades, code enforcement, planning, operations and maintenance, etc.). Responsibilities for disseminating specific information, mechanisms for transmitting it, identification of potential users, and creation of feedback mechanisms are but a few of the areas that must be

explored in much greater detail. Many of our present problems are compounded by ignorance and lack of valid, reliable, information by those who need it.

3. Concern has been expressed that those firms which voluntarily achieve significant energy conservation will inadvertently be penalized at a later date if mandatory allocation programs are imposed. The concern is over the base year usage figures that have been used in the past as the basis for developing allocation formulas. Businesses need assurances that allocations will not be based on fuel consumed after implementation of a conservation program. If reliable assurances cannot be provided, a serious disincentive against voluntary conservation programs will continue to exist.

It is generally assumed that economic efficiency alone is enough of an incentive to get organizations to conserve. It is expected that for the most part this is true. There are likely to be cases, however, where faced with uncertainty with respect to reliable supplies, conservation efforts would not be pursued as strenuously as they might otherwise be. This issue should be addressed in the document recommended in III. 2., above.

It is recognized that the private sector will react primarily to short-term economic incentives or else

to coercion by regulation. The former is preferable. It is beyond the scope of this report to investigate potential incentives. Governments at all levels, however, must be cognizant of this economic fact of life as programs and policies affecting the private economic sector are developed.

4. Peaking Power Problems

The Atlanta Regional Commission is not involved to any significant degree in issues relating to the provision of necessary electrical generation facilities. The following comments on peaking power, therefore, represent observations from a somewhat divorced vantage point.

There are two components of the electrical peaking power problem: facility needs, and pricing policies. With respect to facility requirements, it is common practice in the electric utility industry to have an operational system with a capacity 20 to 25 percent above peak demand. This is considered necessary in order to meet such demand while still allowing for normal equipment maintenance and down-time. Since peak demand occurs infrequently, the implications are that much of the system is not needed during normal operational periods. Building a system to meet peak demand is thus inherently inefficient and costly, although standard under present

operational guidelines and policies. Cutting peak load demands could be beneficial not only to the average citizen, but also to the electric utility industry. Utility systems are more efficient when the gap between the peaks and valleys of load demand can be reduced, and a more uniform load demand established. To accomplish this, however, is difficult. Four possible approaches are available, and need to be investigated in much greater detail. The first is a communications oriented approach, with the objective being to educate consumers about the implications of peak load problems, and to introduce them to measures which they could utilize to help reduce peak demand. The second approach is to not build the facilities needed to meet peak demand, but rather place greater reliance on meeting such demand by supplementing local generating capacity with electricity transmitted from other regions. Electric utilities throughout the country are already connected by a GRID system. Since the timing of peak demand periods is likely to vary between geographical regions, capacity exchange between regions appears to have much more potential than is presently being utilized. Apparently, electrical utilities prefer to have their own dependable capacity on line, and once on line it's cheaper than buying capacity through the GRID system. A system based on the pooling and exchange of reserve capacity might, however, be cheaper and more efficient when compared to

a series of independent systems, each built with excess capacity that remains underutilized a large percentage of the time. A third approach would be to build systems incapable of meeting extreme peak demand, but rather in those infrequent cases when voluntary conservation is not sufficient to reduce demand to within generating capacity, a rationing program could be implemented. During such periods, a "brown out" would be a possible occurrence. (A "brown out" is a condition where voltages normally supplied to consumers are reduced by a certain percentage only during the hour or two during which peak demand exceeds generating capacity. It is normally exhibited by a lowering of the intensity of electrical systems, such as lighting.) Obviously, a much more detailed analysis of the impact of such policies on different types of equipment and users would be needed before an electrical utility or a public service commission would agree to a deliberate policy of this type. It is clear, however, that as our natural resources are depleted and become scarcer and more expensive, society cannot continue to develop systems and policies that are based on unconstrained demand. Such systems are inherently inefficient and wasteful, whether talking about electricity, water, minerals, or any other natural resource. A fourth approach is to try to control peak demand through pricing policies. Present pricing

policies frequently include provisions for price discounts to high volume users. Additionally, there is frequently no price differential between energy consumed during peak and off-peak periods. Pricing policies with disincentives for using energy, especially during peak demand periods have to be explored on a much broader basis than has been done to date. Specifically, higher charges for energy utilized during peak day periods, and a price system where rates increase as consumption increases have to be explored.

The peaking power problem is somewhat unique in that varying approaches for reducing electrical demand are oriented toward different groups: consumers, the utilities themselves, and the regulatory commissions. The idea of cutting peak demand through reduced usage is, therefore, to a large extent a communications problem. Both individual and commercial consumers need better information about this issue than is presently available. Workshops for commercial users, and mail-outs to individual users, perhaps as a requirement to be distributed along with monthly utility bills, are potential tools for educating consumers on how they can save both energy and money. Coordination of such an effort would appear to be an appropriate state responsibility.

GRID exchange systems and reduced capacity systems would be primarily a utility responsibility, which would have to be carried out under the auspices of federal regulatory and distribution agencies.

With respect to the varying time-of-day pricing policies, there are a number of pilot studies underway throughout the nation. Wide-scale action in this area will most likely await the results of these studies. If positive conclusions result, such pricing systems could be initiated in two ways: as a result of policies of state regulatory agencies (public service commissions); or at the initiation of local utilities upon approval of the state regulatory commissions.

5. Having adequate quantities of fuel is extremely important to Atlanta's role as a major distribution center. Aviation related activities are especially important to the economic viability of the southside area in the general vicinity of Hartsfield Airport. Increased prices of aviation fuel have already had a significant economic impact on the airlines serving Atlanta. Uncertainty with respect to fuel availability, future prices, and the impact of such prices on the aviation industry is compounding this situation. Delays in needed decisions and in capital improvements and expansions could potentially result. The long-term

economic impact on certain sectors of the Atlanta economy is directly related to activities within the aviation industry. A better prospectus on the potential results of increased fuel prices and decreased fuel availability on airline operational policies is needed. This would appear to be an issue most appropriately addressed at the federal level.

6. Tax receipts from the sale of gasoline are used for both street improvements and new construction. Efforts to increase automobile mileage and to discourage unnecessary driving if successful, therefore, will result in a decrease in the amount of revenue that will be available for these types of improvements. Whether revenue will meet projected needs is an area that will have to be investigated by the State. Where necessary, alternative revenue sources should also be investigated.

7. The tax bases of many urbanized areas, especially older central city areas, are not increasing at the same rate as the cost of services. Significant increases in the price of gasoline and other fuels, for example, could significantly increase the costs of providing certain services, and possibly result in a curtailment or decrease of those services in some instances. Any services, such as police and sanitation, where the large scale use of vehicles

is essential, could be significantly impacted. This problem must be recognized, and means for dealing with it thoroughly investigated. The primary responsibility for doing so should rest with local government. Solutions based on alternative taxation policies, however, would probably require State ratification and support.

8. The inflationary impact of petroleum price increases on the building/construction industry has been significant. These price increases are reflected in both delivery and manufacturing costs. Consequently, the cost of new housing is increasingly going to be beyond the means of larger percentages of the population. Through a rippling effect these cost increases will be felt throughout the housing industry. The difficulty in finding a decent house at a reasonable price, especially for those people at the lower end of the economic spectrum, is bound to increase. The social implications of this are significant. This is an issue that is so broad in scope that it appears essential that the impetus in meeting this problem come from the national level.

An additional related concern is that energy costs and uncertainty as to future fuel availability could result in what is presently considered low cost central city housing being converted to inner city high

cost housing. Although there would be some positive aspects associated with the shift, the impact on the existing low and moderate income housing stock would be substantial. This is an issue that local governments must consider as part of their community planning activities.

9. Changes in typical building design and construction offer the potential for significant energy savings related to home heating and cooling. This area has received minimal consideration in the past. Most energy consumed by the residential and commercial sectors is used for space heating and cooling. In the case of the commercial sector, it is expected that most new structures are well insulated and storm proofed. These structures, however, are rarely designed to be energy efficient. In the residential sector, potentially significant energy savings resulting from improvements in ventilation, insulation, and weather proofing are possible. For buildings constructed under existing or previous building codes, thermal efficiency considerations were minimal with major emphasis on health and safety standards, and thermal efficiency improvements are for the most part on a voluntary basis. For retrofitting existing structures, therefore, strong incentives are necessary if significant savings are to occur. Tax write-offs for such improvements is

one possibility. Whether a large loss of tax revenue for this purpose is in the public interest, however, is a question that has not yet been adequately addressed. In the interim, other incentives for encouraging energy efficiency improvements to existing buildings must be explored. For new construction, building code requirements that would improve thermal efficiency, including provisions for solar heating and cooling, have to be developed and their implications analyzed in much greater depth than has been done to date. There are a number of efforts underway in this area. The Atlanta Regional Commission as part of its housing planning efforts has done some work on how site design techniques could be utilized to conserve energy. Significant work has been done elsewhere on developing codes that promote more energy efficient building. Given the wide-spread applicability of this type of effort, it appears that the development of model codes would be an appropriate activity of the State Energy Office. The primary federal role would be in the development of incentive legislation should such legislation be deemed appropriate after more detailed analysis.

10. Another energy related problem with significant economic implications is resource recovery. Solid waste disposal is already a major problem in many urbanized and urbanizing areas. Present problems will undoubtedly

increase as land suitable for disposal becomes scarcer and more expensive, and as consumption and waste loads increase. Concurrent with a concern about what to do with these wastes is a concern about the depletion of our natural resources. It is now an accepted fact that many of our waste products can be reused or recycled instead of being thrown away. The technology for doing so is already available. The burning of wastes as a fuel for either power generating facilities or for space heating and cooling systems is being investigated as a final stage in a number of resource recovery systems. If the technology is presently available or at least potentially available in the near future, and if energy related resource recovery could assist in the solving of two of our major resource problems, it is logical to ask why more activities are not underway in this field. Although it is difficult to generalize, one reason is that proposed resource recovery systems involve large front end capital expenditures, and to make such investments attractive, some assurance that the projects are going to pay for themselves or at least be more cost effective than existing disposal systems is essential. Two areas where assistance is needed, therefore, are in providing the front end capital, and in providing guarantees or market incentives to help insure that

the end products of a resource recovery program are economically competitive with the raw materials market.

IV. Summary

As the preceding pages indicate, energy problems are not the exclusive concern of any one organization or any one group. Governments, at all levels, have many different responsibilities and roles to play; the private sector is a major actor; individual citizens can and do have an impact; and organized interest groups can wield significant influence in determining how energy problems are addressed.

At the substate level, no one is specifically charged with the responsibility for energy management. Consequently, analysis of energy impacts, transmission of pertinent information, and communications between levels of government relating to energy problems are normally on an ad hoc basis, and are frequently hampered by a lack of reliable information. A more systematic inter-governmental approach to energy problems has to be developed.

The primary focus at the local governmental level should be on the energy impacts of developmental policy decisions relating to land use and transportation. A greater awareness of energy implications of these policy decisions has to be developed. At the present time, significant progress in this area appears dependent on better information, and on the policy support of other levels of government. A regional planning body, such as ARC, has an obvious role not only

because of its planning responsibilities, but also because its structure suits it to perform as a clearinghouse for the dissemination of energy information pertinent to a variety of local governmental operations.

APPENDICES

Transportation Related Energy Consumption Associated with the Atlanta Regional Commission's Regional Development Plan (RDP).

Fuel (gallons/day)	1970	2000[1]
Auto	1,911,426	5,422,846
Bus	14,805	64,625
Total	1,926,231	5,487,471

Electricity (KWH/day)	1970	2000[1]
Rail	-	2,867,500

Total Energy Expended Daily (in billions of BTU's)[2]

1970	2000
262	771

Precent of Total Energy Expended by Mode

Mode	1970	2000
Auto	99.2	95.7
Bus	0.8	1.1
Rail	___	3.2

Notes:

1. Represents the average of the two RDP alternatives most closely approximating the adopted RDP.

2. For rail transit, KWH expended represents electrical output from a power plant. For comparative purposes, a power plant efficiency of 40 percent was assumed.

COMMUNITY COST ANALYSIS
ENERGY CONSUMPTION

	Community Development Pattern (10,000 Units)					
	I	II	III	IV	V	VI
	Planned Mix	Combination Mix 50 Percent PUD, 50 Percent Sprawl	Sprawl Mix	Low Density Planned	Low Density Sprawl	High Density Planned
Annual Consumption of Energy [2]						
Natural gas, billion BTUs per year [3]	999.418	999.418	999.418	1,347.090	1,347.090	795.177
Electricity, billion BTUs per year [4]	751.020	751.020	751.020	1,007.610	1,007.610	604.960
Gasoline, billion BTUs per year [5]	1,066.043	1,284.313	1,531.053	1,385.540	1,705.037	837.263
Total Billion BTUs per year	2,816.481	3,034.751	3,281.491	3,740.240	4,059.737	2,237.400

Note: This information was taken from a report titled The Costs of Sprawl dated April, 1974 and prepared for HUD, EPA, and CEQ by the Real Estate Research Corporation.

APPENDIX B

Car Pooling in the Atlanta Region

Several public and private agencies in the Atlanta area are operating or have operated carpool programs. In late 1973 and early 1974, in response to the energy crisis, at least five projects were launched: Klass Karpool, the Georgia Department of Transportation Commuter Club, and programs for Texaco, Norcross Western Electric and Georgia Institute of Technology employees. In addition to several privately sponsored programs, there is a Park N' Pool program sponsored by the Georgia Department of Transportation (GDOT). These programs have generally consisted of promoting carpooling through special campaign materials and matching commuters to appropriate carpools, The following is a brief description of selected carpool projects.

Klass Karpool

Klass Karpool which was initiated November 1, 1973, was sponsored by the Atlanta Chamber of Commerce and the Atlanta Jaycees to assist employers in organizing carpooling among the 600,000 employees in the Atlanta urban area. Radio station WKLS and WAGA-TV assisted in promotion; the Georgia Motor Club, volunteers and the Compu-Serv Network provided computer matching services. Of 2000 persons expressing interest in carpooling, over 300 were matched. An estimated 48 persons joined carpools. The program was terminated in mid-1974.

GDOT Commuter Club

This areawide matching program was sponsored by GDOT and began November 25, 1973. "Match Boards" were placed in ten Atlanta central area office buildings and two hospitals to facilitate the organization of carpools among the 50,000 employees in the vicinity. The boards carried index cards on which interested employees could report their residence and availability as rider or driver for a carpool. The cards were stored in the board's appropriate location file for inspection by other prospective carpoolers residing in the same geographic area. Follow-up arrangements for a carpool were the responsibility of the registrants. It is estimated that 50 joined carpools as a direct result of the match boards. This estimate is based on a very small sample and may underestimate the actual number of persons forming carpools. The boards were taken down in the fall of 1974.

Western Electric Operation "Pool It"

On October 23, 1973, Western Electric in Norcross provided for its employees interested in carpooling computer matching services with the assistance of the Georgia Institute of Technology. It

was estimated that seventy persons out of 2200 employees began pooling as of February 25, 1974.

Texaco Operation "Pool It"

Texaco's program, which began December 15, 1973, had also received assistance from the Georgia Institute of Technology. It provided the incentive of 24 reserved parking spaces for carpools of three or more passengers. Of 556 employees, 80 persons are in known carpools. Also, it is estimated that an additional 80 persons have organized carpools on their own. A staff member is assigned to the administration of the carpool program and reports are made periodically to compare and evaluate Texaco's carpooling activities throughout the country.

Georgia Institute of Technology Carpool Program

A mailing was sent to all faculty and staff on February 15, 1974, providing a list of all personnel by zip code, to facilitate carpool arrangements for those interested. Of 2000 faculty and staff, 150 are estimated to have joined carpools. The program has been discontinued.

Park 'N Pool

This demonstration project is an areawide matching program sponsored by the Georgia Department of Transportation. Parking is available at participating shopping centers, which can serve as meeting places for carpoolers and where match boards are located. During the first phase of the demonstration, three locations were chosen for study: a grocery in Douglasville, a shopping center in the Conyers area, and a shopping center in the Decatur area. Less than 50 requests for carpool matching have been received. In June 1975, match boards were placed in three Richway Stores in Roswell, College Park and at Tara Bend near Jonesboro.

Carpool Parking Proposal

In 1974, a proposal for construction of two carpool parking lots to be located in the I-85 North Corridor near the intersections of State Route 365 with State Routes 53 and 20 was submitted to GDOT by the district office. Each lot was proposed to accommodate 60 cars. A proposal to evaluate the parking lots and the Park 'N Pool program was submitted to the U.S. Department of Transportation, but was withdrawn when GDOT decided not to construct the lots.

State Capitol Complex Carpooling Proposal

About a year ago, GDOT considered implementation of a proposal from the Georgia Institute of Technology to operate a carpool program geared to the 6000 employees in the state office complex. The program was to involve a survey of employee transportation needs, a determination of interest in carpooling, a promotion campaign, a computer matching service, and a program follow-up. In October 1974, however, the Georgia Attorney General's office determined that it was illegal for GDOT to contract for a carpool program. The proposal has not been pursued.

Modnar, Inc.

A commuter service known as Modnar, Inc., which currently operates one van in Sandy Springs and two in Peachtree City, provides virtual door-to-door service for commuters to the Atlanta CBD. The 9-to 14- passenger vans are equipped with individual bucket seats, reading lights, refreshments and FM radio. The monthly fee is $30. The owners of the service applied to the Georgia Public Service Commission for a certificate of public convenience and necessity to permit expansion of the service. It was anticipated that by 1977, the service would also be available in Cobb, Clayton, Douglas, Gwinnett, Henry and Rockdale counties including trips into and out of DeKalb and Fulton counties.

Analysis of Carpool Effects

The participation in carpool programs in Atlanta has been very low. Although employer-sponsored programs such as Texaco, which offered parking incentives, have had significant response, it is estimated that less than 300 cars have been removed from the road as a result of the projects described here. Carpooling would significantly decrease congestion, but apathy or disinterest has for the most part, limited the effectiveness of this scheme. Carpool organizers attribute the poor response to Atlanta's relatively less acute problems of congestion, smog, and fuel shortages compared to those of other cities, and to the absence of local direction in energy conservation. Thus far, organizational efforts and incentives have not been strong enough to enlist significant public participation. Although carpool programs in the Atlanta Region have generally had limited success, programs in other areas of the country have demonstrated that carpooling can be one of the most effective techniques for decreasing peak period automobile use. Programs vary in the size of the population group or the geographic area involved, the kind of information system used to solicit and match prospective participants, the management responsibilities assumed by the sponsor and the incentives offered to enlist and sustain participation.

Costs

The operating cost of carpools per passenger mile are substantially cheaper than that of single occupancy automobiles. The U.S. Department of Transportation estimates automobile operating costs at between $.10 and $.18 per mile, depending on the size of the vehicle. For vehicles with five to six seats, carpool costs range from $.02 to $.03 per seat-mile. U.S. DOT estimates that three out of four carpools use free parking spaces.

Travel Time

Carpooling may increase door-to-door travel time, depending on the pattern of collection and distribution at origin and destination. Carpoolers can be picked up at their homes or assemble at a common place. Priority treatment for buses and carpools can more than offset extra time incurred for collection and distribution. Bypass lanes at metered freeway ramps and toll plazas are such techniques, and are discussed in the section on priority techniques for high occupancy vehicles. Carpool lanes in California have saved from five to eight minutes of travel time. The Shirley Highway reversible lane for carpools of four or more passengers saves up to 13 minutes of commuter time each way.

Volume

A critical measure of the effectiveness of carpooling is the increase in vehicle occupancy. Average work trip occupancy varies from city to city. In 1970, automobile occupancy rates for work trips produced and attracted in the various planning districts in the Atlanta Region ranged from 1.03 to 1.24. Los Angeles peak period vehicle occupancy is also very low at 1.2. Washington, D.C., however, has an average peak period automobile occupancy rate of 1.5. Of the 1200 employees of FHWA in Washington, 65 percent are in carpools organized by the computer matching program and other carpooling efforts. Overall automobile occupancy for these employees is 2.45, with an average carpool occupancy of 3.8. The carpool program at the Boeing plant in Seattle has 29 percent of its employees enrolled and has increased average automobile occupancy from 1.26 to 1.38. On the San Francisco-Oakland Bay Bridge, the number of carpools doubled and vehicle occupancy increased from 1.33 to 1.43 as a result of the priority lanes and free tolls for carpools during the morning peak. Slight increases in the occupancy rate can mean significant reduction in the use of automobiles. For example, increasing auto occupancy from 1.2 to 1.5 persons per car would reduce the number of commuting automobiles by 20 percent. The U.S. Department of Transporta-

tion estimated that comprehensive carpool matching programs representative of a cross section of activities which were sponsored during the recent energy crisis, and for which data are available, decreased automobile usage by 23.5 percent among 197,000 auto commuters.

Environmental Impact

Automobiles in freeway traffic produce .0615 kilograms of pollutants per vehicle mile. This figure is derived from the U.S. Environmental Protection Administration average emission factors. It is based on nationwide statistics and reflects the average emissions in carbon monoxide, hydrocarbons and nitrogen oxides for the average age mix of cars in 1975 traveling at 19.6 miles per hour. Fuel savings for vehicles averaging 12 miles a gallon for a hypothetical 10 mile commuter round trip would amount to over 200 gallons per year for each vehicle taken from the road.

Institutional Implementability

The major problems of institutional implementation have occurred where the organization and operation by carpool sponsors have been poorly planned and administered. Area-wide programs that appeal to a diverse population such as those promoted by radio stations for a metropolitan area generally had low participation. Better results have been achieved by programs sponsored by a company for its employees, who have a common travel destination, who function for work purposes as a relatively well-defined community, and who are encouraged to participate by high-level administrators. Successful city-wide efforts, such as the Portland Metropolitan Area Carpool Project, have concentrated primarily on employees at specific sites. Administrative follow-up is crucial in sustaining and expanding carpool membership.

Although Georgia does not have a "guest-statute", the courts have generally made a distinction between guest passengers and passengers for hire--a driver having greater liability for the latter. Carpools are not subject to regulation by the Public Service Commission. As long as carpooling is organized and administered as a voluntary program, sponsors would not tend to be liable for the safety and security of carpool participants. Sharing the expenses of carpooling would not give rise to taxable income or deductible expenses.

In most cases, the position of an insured driver will not change with the formation of a carpool. Each driver's insurance offers protection on the day he or she operates the vehicle. It might

be prudent, however, to increase the coverage for bodily injury, since the potential damages of a group of wage earners would be greater than that for a typical family.

In Georgia, the Attorney General's ruling that GDOT has no legislative authority to contract for carpool programs, is a barrier to the operation of state-sponsored carpool projects. Currently pending in the legislature is a provision that would specifically authorize GDOT to operate ride sharing programs.

Public Acceptance

Participation in carpools appears to be in part a function of the incentives offered and the effectiveness of a sponsor's promotion and management. Where reserved parking, priority lanes and free tolls have been available, carpooling activities have increased significantly. These incentives operate most effectively of course in areas where peak period congestion is very high and parking spaces are scarce or expensive. A well-organized program which facilitates matching and provides on-going administration also increases and sustains participation. An active program of public information and the endorsement of carpooling by high level administrators and government officials increase public awareness of the need for more efficient modes of travel.

Project A-1756

FINAL REPORT:

SUBSTATE ENERGY MANAGEMENT

June 27, 1975 - February 15, 1976

by

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and

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This document is done in partial fulfillment of the requirements of Project No. A-1756 between the State Energy Office and the Georgia Tech Research Institute (Engineering Experiment Station, Economic Development Laboratory)

Economic Development Laboratory
ENGINEERING EXPERIMENT STATION
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Preface

This report deals with the findings of two substate districts in Georgia in regard to energy management. One of the districts could be classified as rural and one could be classified as urban. Southwest Georgia Planning and Development Commission (SOWEGA) has 14 counties in its membership and is predominantly rural in character. The Atlanta Regional Commission (ARC) encompasses seven counties, including Fulton (Atlanta) and the surrounding counties, and is basically urban.

The study considered energy problems as defined by local constituents, definition of the roles played in regard to this matter, and those pertinent communications mechanisms involved internally and externally in this subject area. In addition, participants from both subdistrict staffs received some basic training from the Economic Development Laboratory (EDL), Engineering Experiment Station (EES), at Georgia Tech. Results of the study also were considered by EDL personnel, and their conclusions are presented.

Finally, the study presents the state of energy management at two substate district levels. Problems, needs, and data base would indicate that this study is only a first step toward a substate district program that would maximize benefits to a total substate district energy management program.

INTRODUCTION

Scope of Study

Energy and energy management have become topics of importance among the professionals of the Federal Energy Administration (FEA), the State Energy Office, certain university personnel, and practitioners in the planning, development, and governmental management arts. The Arabian oil boycott firmly convinced these persons that energy management would become and continue to be a crucial element in the overall development of any locale or region. With this in mind, many discussions were held among this consortium of individuals, and it was decided that not only energy per se would be an item of shortage, but that many resources to government and the area would be in various stages of short supply over the next few years. In essence, governments and multicounty planning districts should become concerned with crisis management/planning and cost-saving over the next few years.

This particular study could not, within its constraints, cover all of these items. It was, therefore, determined that this project should concentrate on the problem aspect of the energy situation in multicounty planning jurisdictions.

Background

Assuming that the statistical evidence and the assessment of such energy related data are essentially correct, it is obvious that this country and the rest of the world have moved into an era of scarce energy resources. The period between 1975 and 2000 will be especially critical for the United States and other industrialized nations. The operational procedures in the foreseeable future will be significantly different from the past. Every factor of social, economic, and physical development will be affected. The common denominator will be energy. While a key resource will be the systematic application of technology, public policy will play a dominant role in the directions taken to meet energy needs.

Many energy issues are local in nature or have their biggest impact at the local level. Most of these issues have to be coordinated or integrated into state and federal plans and actions. For instance, municipal utility problems and needs have to coordinated with statewide energy resources planning, local economic development efforts have to take into account state and

regional energy availability, and local transportation plans have to coordinated with area and state plans.

To date, substate planning groups have been generally ignored in planning for and managing of energy-related problems. The question thus remains: What should the role of substate level planning groups be?

- o Should they develop specific policies on energy matters for their own guidance?
- o Should they provide appropriate policy recommendations to client organizations on request?
- o Should they provide for continuing assessment of the energy situation with respect to the nature and magnitude of the impact of specific energy-related material shortages on residents, industry, agriculture, business, and the general economy of their areas?
- o Should they develop energy contingency plans for their areas that could be implemented during emergencies by client agencies?
- o Should the area planning staff have the capability of providing some planning or management assistance to local governments with respect to energy conservation and management?

When these and other questions of role were examined, it was found that the only problem definition available was that done by the professionals mentioned earlier. It became apparent that one vital ingredient was missing -- what the people at the local level saw as the problems. That this item was paramount was further substantiated by the findings of a project conducted in the Northeast Georgia Area Planning and Development Commission area. It was found that local problems -- imagined or real -- in regard to the energy situation differed greatly from those as seen by professional practitioners close to the subject. Consequently, the major thrust of this project was directed at defining the energy problems as seen at the local level.

Objectives

Objectives of this project were several, although the major overall one was to determine those energy management problems that might best be addressed at the substate level. A second primary objective was to establish a mechanism through which substate planners and decision makers could make an input to state and federal agencies that are concerned with energy matters. Other objectives included (1) the definition and outline of energy problems that im-

pact on the local level as seen by area planning and development commission (APDC), county, and municipal personnel; (2) provision of training that would give the participants a "nontechnical" understanding of energy problems and thus, create a minimum level of common competence in this regard; (3) a problem definition and refinement; (4) determination of the role the substate district planner and administrator might play in problem solution development; and (5) an outline of communications mechanisms available to local and area planners and administrators that will allow them to network their needs and make recommendations to the proper state and federal authorities so that these local needs and recommendations may become a part of and take a rightful place in the total energy management scheme.

Methodology

State Energy Office personnel selected the three participants in this study. The Economic Development Laboratory was selected to coordinate the study and to furnish the necessary indoctrination and training of the participants. Two substate planning districts (APDC's) were selected to represent both rural and urban environments. The Southwest Georgia Planning and Development Commission (SOWEGA) serves 14 counties and is headquartered in Camilla. While there is one large city of urban proportions (Albany), the area's character is essentially rural and primary pursuits such as agriculture are common to the area. (See Appendix A for the full SOWEGA study.) The second APDC selection was the Atlanta Regional Commission (ARC), which is headquartered in Atlanta and serves seven counties. Orientation of this organization is almost totally urban due to the metropolitan character of its constituents. (See Appendix B for the full ARC study.)

A work program was drafted and approved by the State Energy Office. This program consisted of the following four tasks:

Task I: Program Coordination, Indoctrination, and Training. A project plan and schedule were developed to coordinate the efforts of the various groups involved in the study. A project coordinator was assigned to assure that progress was maintained according to the schedule. Also, the participants in the project were provided a "nontechnical" understanding of energy problems to assure a common, minimum level of competence. This indoctrination and training was accomplished through informational and instructional programs.

Task II: Problem Definition. State, area planning and development commission, county, and municipal personnel worked together to outline energy problems (as seen by each) that impact on the local level. After the initial outline was made, substate personnel refined and better defined the problems. (Public and private sector and utilities were included.)

Task III: Definition of Roles. From the list of local and area energy problems developed in Task I, a determination was made of what role, if any, the substate planner and administrator can play in developing solutions to the problems. Also, outside technical assistance needs were identified.

Task IV: Communications Mechanisms. An outline was made of the communications mechanisms available to local and area planners and administrators to input their needs and recommendations to state and federal authorities.

EDL personnel employed several methods in approaching Task I. A continuing informational service was established, and the participants had pertinent selected materials passed on to them throughout the project. Several conference sessions were held during the project for training and information of the participants. Topics and specialities were based on two factors: (1) what was felt to be needed to achieve a competency level in the subject area as determined by the State Energy Office and (2) what information the participating principals felt they needed. The latter, of course, was much more specialized than was the former.

Each participating APDC filed a work plan on the project. The main theme and approach taken by SOWEGO was to consider the local energy situation based on fuel types (natural gas, electric, etc.). The main theme and approach taken by ARC, on the other hand, was based on use (transportation, economic activity, etc.).

Other approaches employed in the project was the use of local task forces, citizen and officials meetings, a local conference, and general sessions with various staff members. Finally, data were gathered and analyzed with the initial objectives in mind.

FINDINGS

Full reports of the findings of the two substate districts that participated in this study are appended to this report. In this section, each report is discussed in brief. A summary of the findings of the Southwest Georgia Planning and Development Commission, the basically rural district, is presented first, followed by an outline of the findings of the predominantly urban Atlanta Regional Commission.

Southwest Georgia Planning and Development Commission

A. Electricity. Electricity is provided from three sources to this substate district: (1) Georgia Power Company direct, (2) EMC's, and (3) municipalities. Both 2 and 3 purchase power for resale from Georgia Power or the Southeastern Power Association. Problems can be grouped under four categories:

1. Demand. The primary problem of major proportion here would appear to be the availability and aggregation of data for the substate district. The municipalities have to provide fairly complete and comprehensive data to the Federal Power Commission (FPC), thus data by use and on peaking are readily available and easily aggregated. However, both Georgia Power (GP) and EMC districts include areas outside the APDC boundaries. Consequently, the data can not be aggregated on the APDC basis. While certain data are available from GP and the EMC's, there is then a need for such data to be broken down to the subdistrict statistics and, in certain instances, the need for additional or increased data on certain items that would be pertinent to energy planning (i.e., data for estimating previous consumption and projected consumption based on various scenarios).

Data also are needed that will give insight into decreasing consumption at a time when large annual increases in electric consumption have been the rule. Another data need occurs in those figures needed to analyze the role of pricing rate structures in terms of energy conservation and management.

Other problem areas exist also. Study of the intricacies of price response and price changes to other alternate energy services is needed so that needs can be projected more accurately. Aggregation of total consumption data from all three electricity suppliers into one composite was indicated as a problem.

2. Supply. Problems related to increased electric generation will arise. These problems will involve environment, coal transport, facility siting, and other issues. Price would appear to be the crux of the electricity problem in SOWEGA, thus there should be management at some level that could hold price increases to a minimum. Power suppliers in the area feel that peak demand is much more of a problem than is increased energy demand. Another current problem is that a surplus of electricity exists in the area during winter months, and the surplus capacity exists in a relative manner even during certain days and hours in the summer months. The foregoing supply problem is one of load management rather than of conservation. Finally, the problem involving large-supply considerations remains in the area.

3. Impact. Growth/no-growth or controlled growth policies must take into full consideration the increasing levels of energy use, peak demands, and supply. A second consideration should be consumer price and consequent economic effects. A third and final consideration is price impacts on special groups such as the elderly or fixed income and other low income groups. Here the question of special privileges and/or prices arises. Perhaps this problem may best be handled by social welfare intersts, although some of the valid and solid economic data of the substate district should be a primary input to any programs of this orientation.

4. Special Management Practices. Management of power in the substate area was recognized as a major problem. Several possible solutions were considered, but each had liabilities. Voluntary conservation practices are not really successful because the public is not aware or does not believe that the critical issue is peak demand. Further, conservation literature and programs ignore this fact for the most part. Technical innovations would aid in peak reduction, but to date such devices are limited in number and/or availability and are not practical in terms of cost. There even appears to be a lack of basic research oriented towards such items. Local facilitative legislation on policy for conserving and/or managing energy is needed, but a problem of how to present this and get local implementation exists. Such legislation might deal with land-use regulations, codes, new construction, and other methods that as yet have not been identified. Problems in the alteration of life styles that may be brought about by policy necessary to manage and fully utilize energy resources also will occur. Pricing and rate

structuring are areas where problems exist in both how to go about it and where to apply it. Problems also exist in people not relating KWH to demand, and an understanding of the relationship of response in terms of energy to response in terms of peak demand is needed.

Miscellaneous problems were also encountered during the course of the project. These included the reluctance of manufacturers to divulge any information.

B. Natural Gas. Natural gas is provided to the SOWEGA district from two sources: (1) municipalities and (2) South Georgia Natural Gas Company headquarters in Thomasville. One distinct feature of natural gas is the practice of specific contracting and direct purchasing from South Georgia Natural Gas by industrial customers. Problems related to this fuel type are grouped into three categories:

1. Demand. There is a lack of certain basic data on previous and current consumption, and these data are necessary for energy planning. Specific data needed include daily allotments for municipalities over the previous ten-year period; data on total amount of gas available to the municipalities annually over the past ten years; total consumption data annually for the ten-year period in the municipalities; data that will permit comparison of availability and consumption for previous years; and data that would reflect type consumption by customer use (e.g., residential, industrial, etc.). Since data are lacking that would permit establishment of consumption/demand patterns, it is difficult to ascertain trends and projections that can be related to economic factors. A problem exists on data that can aid in determining causes, effects, and possible solutions to the winter peaking shortages of gas. Other data of this nature might serve to help in proposed management of both gas and electricity with consideration of opposite peaking seasons. Lack of precise peaking data causes problems in dealing with municipal daily delivery and daily allotments. When daily allotments are not used, the city in question loses a resource that it cannot recoup. Another problem relates to information availability on written policies, procedures, contracts, and allocations. Problems also exist in the area of "peak shaving" of electrical use. Many municipalities are not sure of the cost benefits and have no place to obtain the economic facts that could lead to a go/no-go decision. There is a need to manage natural gas so that maximum resource utilization is offered. Data are needed to determine

what users might go to alternate sources if shortages due to allocation cause the need for this type of plan. Long-term data are needed on direct customers (i.e., industry) that will allow researchers to obtain a total picture of consumption patterns. There is a need to obtain data that can be aggregated from both municipal customers and direct customers so that consumption/demand can be analyzed and related to the various economic indicators (e.g., employment, output, etc.).

2. Special. Problems occur in SOWEGA that are unique to this district. These special problems are related to agriculture and its needs for nitrogenous fertilizers and crop drying. It requires 40,000 cu. ft. of natural gas to fix one ton of NH_3 (of this 2/3 is for feed stock and 1/3 goes for energy requirements for production). A full docket on natural gas/nitrogen fertilizer should be developed and maintained to assure that necessary actions can be quickly implemented should shortages of natural gas occur either here or at the source of the fertilizer supply. This district accounts for 25% of Georgia's natural gas requirements for crops. Thus data need to be developed that will allow measurement of shortages versus crop production and food supply. Fuel for crop drying is yet another need unique to this type of district. The drying process is especially utilized with the peanut crop, and this district accounted for 20% of the U. S. peanut production in 1974. At present, about 50% of the drying is done with natural gas and the other 50% with LP gas. Shortages and reduced allotments of either gas type should be anticipated, and data should be collected that would permit this crop need to be figured into the local, state, and national strategies.

3. Impact Analysis. Shortages of natural gas have already had and will continue to have a detrimental effect on this district. Loss of potential industry and other economic activity has been documented time and again. There is a need to compile accurate data on all local industry so that analysis can be done to ascertain who can or cannot use alternate fuels, should natural gas become unavailable. Data also are needed so that natural gas supply can be best managed to minimize the impacts of shortage. Data and an analysis system are needed to examine the industrial sector. Further, data also are needed on residential useage so the trends in use can be established and consequences of shortages can be examined. Problems associated with agriculture have already been discussed. Finally, any direct, but more specifically, indirect effects of fluctuating gas supply on the whole commercial realm must be examined.

Here little or no data base currently exists.

C. LP Gas. This topic presented the most vague fuel element in terms of data. Very real problems exist not only in data, but in data sources. These gaps occur in data on supply, demand, peaks, allotments, distribution systems, and types of uses.

D. Gasoline and Diesel Fuel.

1. Demand. A differing market structure necessitates a different approach to understanding and analyzing gasoline and diesel fuel. The private sector is the chief distributor of these fuels just as it is with LP gas. Here again, consumption and/or demand form the basic point of departure for study. State data on consumption of taxable gasoline and diesel fuel are available; however, certain problems occur with these data. Since both fuels are combined in reports, there is a need to separate gasoline from diesel fuel. Secondly, a percentage of this total is assumed to be gasoline by the state, and the amount of gasoline is then computed on this basis. However, the validity of this percentage assumption must be tested, especially at a substate level, if data are to be truly meaningful in the study of relationships to the various economic indicators. Even when the foregoing is done, problems still exist as fuel purchased by the federal government is not included in the revenue data. This would not affect many substate areas other than those with major government installations, but it can have some effect on ascertaining total supply availability and total demand for the state. The State Department of Revenue claims that nontaxable gasoline to farmers is included in their data. However, nontaxable diesel fuel is another case, as much of this fuel type consumed throughout the state and in the substate district is nontaxable. Typical uses in this category include farm consumption, power companies, home heating fuels, and industrial heating and processing. Again, a percentage of nontaxable is assumed, thus there is a need for a validity check system. There is a need to orient auto registration data so that it can be used for full projection. When vehicle registration with the national average gallonage is used to derive consumption, the state's consumption figures are somewhat lower than that arrived at by Department of Revenue methods. A problem that is unique to the rural substate district deals with allocation methods, since the farmers necessary journeys for supplies and market products do not show up in the area consumption using the present system. Consequently, consumption data are low for the district. Commuting patterns

pose a further problem element as many workers in the area are forced to commute considerable distances, and the dispersion of job opportunities precludes extensive carpooling operations. Other sectors in which fuel data collection appears to be a problem are residential, transportation, commercial, industrial, power generation, institutional, government, and certain phases of the agricultural operation.

2. Supply. Due to existing surpluses of gasoline, there is little or no interest in conservation and management of this fuel beyond the concern of high prices. Distrust of government and big business presents a further problem to any cooperation on a conservation program. Problems also exist in and among the various service stations. Many of these problems are more imagined than real and involve personalities. Even the Georgia Association of Petroleum Retailers (GAPR) does not recognize future problems that might arise in regard to any energy crisis. It also appears that since allocations are based on historical data that the substate area as an entity has little input to this, and it would appear that such input would be invaluable. Finally, a problem of perhaps major proportions is one of public opinion: people feel that if they do conserve and another crisis comes, they fear that base allocations will be changed to reflect these savings and they will get less allocation because of their conservation.

3. Impact Analysis. This matter presents a complete problem element as no data presently exist that could aid in this, and there is nothing on which trend analysis could be done were a shortage to again occur. Current surplus supplies are having an effect on potential marketing structure, but possible shortages do not figure in on this. Price increases impacted and created problems, but again there is no one data base that currently exists that would permit true appraisal or projection related to this item. A problem element also exists in uncontrolled takeover of retail outlets by large wholesalers, since this puts the substate district at the mercy of those unrelated to the district's unique problems. Finally, problems in life style changes due to high gasoline prices exist among those of moderate and low income, and these should be examined.

Atlanta Regional Commission

The second substate participant involved in this project was the Atlanta Regional Commission. This body is made up of seven counties. It includes the

area known as metropolitan Atlanta; consequently the entire flavor of the region is urban oriented as opposed to the primary rural character of the other participant. These contrasting orientations permits a review of the differences and likenesses for urban and rural energy problems, roles of players, and communication networks.

To the Atlanta Regional Commission, it became immediately apparent that a major problem is that while future fuel availability has to be a component of the local decision-making process, ability to prevent such shortages is at present not really available to local governments. Another problem of energy management grows out of the proliferation of federal agencies dealing with the energy issue and the consequent lack of defined responsibilities. There is also little evidence of an energy conservation ethic among the people in general, yet this ethic is necessary if there is to be true success in saving energy and other limited resources. Long-term energy saving efforts on the part of concerned citizenry must be abetted through furnishing continued information on the energy situation even though a crisis is not currently occurring.

Other problem areas can be grouped under two main categories, transportation and physical development and local economic activity, as outlined below:

A. Transportation and Physical Development

1. If full availability falls significantly short of projected demand, potential impacts could cause disasterous disruptions to the economy.

2. Long-term energy supply data are not available; thus it is difficult to make reliable projections.

3. The attitude that American technology and ingenuity will resolve our long-range energy problems before we are materially affected prevails; thus it is hard to convince people of the true problems that we face both now and in the future.

4. Conflicting information on fuel availability precludes needed consideration of energy and related problems by decision makers who are currently making decisions that will have serious implications five to twenty years from now.

5. Officials at all levels have to have better information than is presently available to them.

6. Pending controversies (e.g., foreign import policies) precludes availability of useful information.

7. Detailed analysis of energy implications in development decisions remains an ineffective exercise at the local level.

8. There is a need for energy impact statements for certain types of developments.

9. Data are needed to determine under what conditions price increases will result in major impacts, changes in travel patterns, and choice of five-year projections on urban travel behavior.

10. Public sentiment against high density development precludes maximum energy conservation; thus data and measures to quantify these savings are needed.

11. Auto occupancy during peak hours is 1.1/auto; thus the need for incentives to raise this figure is apparent.

12. Problems exist in congested urban areas for the implementation of meaningful bicycle programs.

B. Local Economic Activity. Local economic activity is dependent upon energy availability; thus problems in this area could have major consequences on the very heart of the metro area. Problems include:

1. Uncertainty over fuel availability exists at all levels (individual consumers, business firms, and manufacturers), and this affects operational policies and business planning in many instances.

2. There is a need for data to develop a reliable method for provision of estimates of future fuel availability so that reliable predictions on economic activity can be made.

3. There is a need for systematic contingency plans to be prepared so that in the event of shortages or curtailment, allocations can occur that will not lead to the stifling or reduction of critical services (e.g., ambulance, police, sanitation, etc.).

4. It is extremely difficult to communicate energy conservation techniques or information on efficient energy management to the individual. A communications network is needed for this dissemination of information from individuals or agencies to individuals, local government officials, and local businessmen, grouped according to areas of interest and/or responsibility (e.g., transportation, manufacturing, codes and enforcement, planning, etc.).

5. Fear exists that those firms voluntarily achieving significant energy conservation savings will be inadvertently penalized at a later date if mandatory allocations are imposed. This fear even supersedes economic saving realities.

6. Two primary problems occur in regard to the electrical peaking component: (a) problems of facility need arise and (b) problems in the pricing policy area exist. Problems of each power company having their own full peak capacity occur when economies are considered. Problems of demands for different groups (e.g., consumers, utilities themselves, and regulatory commissions) occur when reductions are considered.

7. There is a great amount of uncertainty in respect to fuel availability, future prices, and impact of such prices on the aviation industry. Long-term economic impacts on certain sectors of the metro economy are directly related to the aviation industry of the metro area.

8. There is a need for a better prospectus on the potential results of increased fuel prices and decreased fuel availability on the operational policies of airlines.

9. Programs that discourage auto usage and encourage mileage reductions create problems in the tax base used by local governments to repair and improve streets.

10. Significant price increases in fuel will create problems through greatly increased costs of services and the possibilities of curtailment in some areas.

11. Inflationary impacts of petroleum price increases on the building and construction industries are reflected in higher costs of homes in particular. Consequently, this higher cost plus higher utility costs place housing beyond the reach of a large percentage of the population. This problem is also reflected in sound rental housing availability.

12. Energy costs and uncertainty on future fuel availability could result in present low-cost central city housing being converted to inner city high-cost housing. Thus, while it would have positive effects in the city, it would result in negative effects on the low and moderate income housing stock.

13. Problems exist in promotion of maximum energy efficiency in new construction. Current building codes ignore thermal efficiency standards. There are no incentives for such construction.

14. There are problems of pursuing resource recovery. These occur largely because of a lack of information on certain technology. The risk attitudes of local governments are too conservative. They are overly suspect that such schemes may not pay for themselves, or that they may not provide a more cost efficient form than existing systems (e.g., waste disposal, landfill instances, etc.).

CONCLUSIONS AND RECOMMENDATIONS

Definition of Roles

Southwest Georgia Planning and Development Commission. There will be roles for the APDC depending upon the energy sources being considered. The appended report discusses the roles involved in the various energy types. For example, in the case of electricity, chief role players at present are the utility companies, regulatory commissions, local municipalities selling power, and EMC's. The APDC can, however, play an important role here through promoting various energy management programs.

Natural gas involves at least three principals as the most effective role players -- the utility company, the municipal distributor, and regulatory commissions. Here again, the APDC can play a desirable role through certain related programs.

Both LP gas and fuels (gasoline, diesel, and fuel oil) are almost exclusively in the private sector. Consequently, the usual government roles, especially at the local level, are considerably less direct than with fuels provided by public utilities. However, there appears to be a definite role for the APDC in consideration of these fuel types.

Atlanta Regional Commission. This body sees itself in a role of promoting energy management at every opportunity. It has a role in the long-range development planning that must consider possible energy scenarios. The role of being responsible for energy implications in long-term land use rests with local officials. Much of the generation of reliable data rests with various levels of government, with federal government taking the lead role. The federal government should assume the role of funding consumer auto-related research projects so that realistic assumptions and projections can be made.

Communications. In the studies conducted by both the rural and the urban substate group, perhaps the most nebulous area of the project was that relating to communications linkages and networks. It would appear that a much more detailed study of components in these systems is necessary.

Recommended Considerations

The foregoing materials and the appended reports indicate that there are several further considerations in the matter of energy management at the substate level.

First, it appears that the substate planning district can play a role of major importance in the primary and secondary efforts of the total energy management scheme in its particular area. In fact, this body can serve as the one focal point touching all local facets of input. In Georgia, the role of a regional clearinghouse enhances this link to the local scene.

Second, it is concluded that a need exists for training of substate district personnel. This training should include a curriculum that would train the participant to be conversant and have an understanding of the entire energy spectrum in his domain. Such training should even include a layman's knowledge of basic technical aspects of energy supply, demand, and management.

Third, a need exists for further study of definitive roles of the various elements involved at the substate level. The APDC can serve as an effective liaison for all of the role players. The district also can make a significant contribution by helping the various players to determine that role where they can achieve maximum effectiveness in the overall area's optimum management plan.

Fourth, a critical need exists for accurate and compariable energy data that can be aggregated on an area basis and which does not violate any disclosure confidences. Here local sources and outside sources for data must be identified. When this is done, criteria for usable data must be drawn up, and the system must be disseminated with assurance that it will be followed.

Fifth, a chronic need exists for long and arduous study of the various communications networks invovled in the energy management scheme in the substate district. Here all the local, state, and federal agencies involved should be considered.

In addition, there should be further study done in a number of areas identified during the course of this study. There is a need for rate structuring studies in electricity, natural gas, and LP gas. There is a need for study to devise a conservation program that will be effective and meaningful to the general lay public. This program should include materials to explain adequately and understandably the meaning of peak load and its ramifications. Of value to an urban area would be a study of a crisis and resulting housing shifts that would force low and moderate income residents out of the central city. Finally, a number of studies are needed to accurately project fuel uses versus suppliers in the metropolitan area, and it appears that more accurate data are needed before valid projections of this type could be made.

APPENDICES

Appendix A

ENERGY MANAGEMENT AND CONSERVATION IN THE 14-COUNTY SOUTHWEST GEORGIA APDC

(This appendix is attached under separate cover)

Appendix B

SUBSTATE ENERGY MANAGEMENT IN THE ATLANTA REGION

(This appendix is attached under separate cover)